THE BROCHURE

ON

HOME-SCALE FOOD PREPARATIONS SERIES

PH 19/2

Second Edition
(Revised & Enlarged)

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PREFACE

This Brochure is one of the several popular publications of the Central Food Technological Research Institute, Mysore, and brings together, under one cover 60 leaflets on the preparation of products from different raw materials grown in India.

The Brochure is divided in to two parts viz., " Home-scale Fruit and vegetable Preparations Series " giving recipes for the preparation of various fruit and vegetable products and " Substitute Food Series " giving in detail the methods of preparation of some substitute foods and food products. It is hoped that the Brochure will prove useful in meeting the everyday requirements of the housewife and also partly of the those interested in the preparation of these products as a cottage industry.

For this compilation, collections and selections have been made from the published works of the Central Food Technological Research Institute, Mysore and those of the former Indian Institute of Fruit Technology.

Information relevant to the subject including that on the machinery and equipment for the preparation of the products on cottage-scale has been incorporated in the body of the several leaflets constituting the Brochure and an alphabetical list of items of equipment together with their approximate prices and sources of availability in India are given in leaflet No. 31 of the first series.

The Brochure has been nominally priced at Re. 1/–only *postage extra*. Separates of the leaflets are available free of charge from the Division of Food Information and Statistics of the Central Food Technological Research Institute, Mysore.

May, 1955.
C.F.T R.I. MYSORE.

V. SUBRAHMANYAN
Director

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1269

CONTENTS.

SUBJECT OF LEAFLET			LEAFLET NO.
FRUIT & VEGETABLE PREPARATIONS SERIES			
Preparation and Preservation of Orange Squash			1
Do	do	Lime or Lemon Squash	2
Do	do	Lime Juice Cordial	3
Do	do	Lemon or Lime Barley Water	4
Do	do	Mango Squash	5
Do	do	Passion Fruit Squash	6
Do	do	Fruit Syrups	7
Do	do	Unfermented Apple Juice	8
Do	do	Tomato Juice	9
Canning and Bottling of		Fruits	10
Do	do	Vegetables in Brine	11
Canning of Curried Vegetables			12
Drying of Fruits			13
Do Vegetables			14
Preparation of Jams			15
Do	Mango and other Preserves		16
Do	" *Petha* " Candy		17
Do	Guava Jelly		18
Do	Orange Marmalade		19
Do	Sweet Mango Chutney		20
Do	Guava Cheese		21
Do	Tomato Ketchup		22
Do	Mango Leather		23
Do	Sweet Turnip Pickle		24
Do	Mango Pickle in Oil		25
Do	Lime and Green Chilli Pickle		26
Preparation and Preservation of Spiced Carrot Juice			27
Do	do	Apple Cider	28
Do	do	Grape Wine	29
Preparation of Vinegar			30
List of Machinery & Equipment			31
Preparation and Uses of Banana Chips			32
Preparation and Preservation of Cashew Apple Jam			33
Preparation of Cashew Apple Candy			34
Preparation and Preservation of Cashew Apple Juice			35
Preparation and Preservation of Cashew Apple Syrup			36

Canning of Mangoes 37
Canning of Jack Fruit 38
Preparation and Preservation of Jack Fruit Nectar 39
Preparation of Jack Fruit Jelly 40
Preparation of Jack Pickle 41
Preparation of Ginger Preserve & Candy 42
Preparation & Preservation of Pineapple Juice 43
Canning of Pineapple 44
Preparation & Preservation of Pineapple Jam 45
Canning of Sapota Segments 46
Preparation & Preservation of Sapota Squash 47
Preparation & Preservation of Sapota Jam 48
Preparation & Preservation of Loquat Jam 49
Preparation & Preservation of Loquat Jelly 50
Preparation of Canned Loquats 51
Dehydration of Ripe Bananas 52
Canning of Ripe Banana 53
Canning and Bottling of Processed Peas 54
Preparation and Preservation of Almond Syrup 55

SUBSTITUTE FOODS SERIES

Preparation of Soyabean Milk 1
Preparation of Synthetic Grains 2
Preparation of Groundnut Milk 3
Preparation of Bamboo Candy 4
Preparation of Bamboo Chutney (sweet) 5
Canning of Bamboo Shoots in Syrup 6
Canning of Bamboo Shoots in Brine 7
Canning of Bamboo Shoots in Curried Vegetables ... ...

INDIAN SWEETS SERIES

Preparation and Preservation of Shrinkhand Wadi 1
Preparation and Preservation of Besan Wadi 2
Preparation and Preservation of Rossogolla 3

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 1

Preparation & Preservation of Orange Squash

1. **Selection of fruit**—Select fresh, fully ripe and sound oranges. Tight-skinned oranges should preferably be graded according to size to fit the size of the rose of the cone type juice extractor (rose being changeable according to the size of the fruit).

2. **Preliminary treatment**—Wash the fruit thoroughly in water or in very dilute solution of hydrochloric acid (1 : 20) to remove the residual spray material and then in running cold water, in small lots at a time, to remove all dust, soil and other extraneous matter.

3. **Preparation of the fruit**—Cut the tight-skinned oranges into halves, or remove the peel and break into segments the loose-skinned oranges.

4. **Extraction of the juice**—Extract the juice with a cone type hand-worked (wheel type*) or electrically worked juice extractor (Mix-Master)* in the case of tight-skinned oranges, and with a screw type juice extractor* for the segments of the loose-skinned oranges. Strain the juice through a coarse muslin cloth.

5. **Recipes**—The following recipes have been evolved on the basis of the experimental work conducted in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research.

* This type of equipment can be had from food machinery dealers like Messrs, Gardners Corporation, Connaught Circus, New Delhi and Messrs. Gladwyn & Co., Hornby Road, Bombay.

Note—(i) A suitable quantity of edible yellow colour is added to bring out the desired shade of colour in the finished product.

(ii) For recipe with high sugar content the ingredients may be mixed by slight warming, if necessary.

6. **Mixing and preservative**— Mix the above quantities of the ingredients thoroughly and strain through a coarse muslin cloth. Finally add the preservative *i.e* potassium metabisulphite at the rate of 5.0 grains per lb. (or ½ '*masha*' per bottle of 26 ozs. capacity) of the finished product.

Note—The preservative which can be had from any chemical supplier or any branch of the Imperial Chemical Industries should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it to ensure uniform mixing.

7. **Bottling and storage**—Pour the finished product into bottles which had been thoroughly cleaned and previously heated in boiling water for 15-20 minutes leaving a head space of 1–1½ inches. Cork air-tight either with crown cork seal or with ordinary cork (slightly wetted and pushed in). Store the bottles in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 3

Preparation & Preservation of Lime Juice Cordial

1. **Selection of fruit**—Select fresh, fully ripe limes ('*Nimbu*' or '*limu*') free from bruises and particularly from fungal attacks.

2. **Preliminary treatment**—Wash the fruit thoroughly under a spray of cold water preferably in small lots at a time to remove all dirt, spray material and other extraneous matter.

3. **Preparation of the fruit**—Cut the fruit into halves with sharp stainless steel knives.

4. **Extraction of the juice**—Extract the juice with lime-squeezers or in a small basket press * and strain the juice through a coarse muslim cloth.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. **Clarification**—Store the juice in large sized glass containers—winchesters or carboys, adding preservative i.e. potassium metabisulphite at the rate 10.0 grains per lb. of the juice. Let the juice settle for about a month or so. Decant the absolutely clear juice without disturbing the sediment and then strain it through a fine muslin cloth

6. **Recipe**—The following recipes have been worked out on the basis of the experimental work conducted in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research :—

	Medium sugar cordial	*High sugar cordial*
Juice	1 lb.	1 lb.
Sugar	$1\frac{1}{4}$ lb.	$2\frac{1}{4}$ lb.
Water	1 lb.	3 oz.

7. **Mixing and preservative**—Mix the above ingredients thoroughly slightly warming, if necessary. Strain the product through a fine muslin cloth. Finally add the preservative i.e. potassium metabisulphite at the rate of 2½ grains per lb. of the finished product.

Note—The preservative which can be had from any chemical supplier or any branch of the Imperial Chemical Iudustries, should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it.

8. **Bottling and storage**—Pour the finished product into bottles which have been thoroughly cleaned and previously heated in boiling water for 15–20 minutes leaving 1″–1½″ space at the top. Cork air-tight with crown cork seal or by ordinary cork slightly wetted and pushing it tightly. Store the bottles in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 4

Preparation & Preservation of Lemon or Lime Barely Water

1. **Selection of fruit**—Select fresh, fully ripe fruit free from bruises and particularly from fungal attacks.

2. **Preliminary treatment**—Wash the fruit thoroughly under cold water spray to remove dirt, spray material and other extraneous matter.

3. **Preparation of the fruit**--Cut the fruit into halves with sharp stainless steel knives.

4. **Extraction of the juice**--Extract the juice with lime-squeezers or in a small basket press in the case of limes and with a cone type juice extractor (wheel type*, if hand worked or Mix Master*, if electrically driven) in the case of lemons. Strain the juice through a coarse muslin cloth.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. **Preparation of barley extract**—Mix about $\frac{1}{4}$ oz. of barley flour with some water and make it into a thin paste. Continue adding the water and stirring till the quantity of water added is about 1 lb. Heat it over a gentle fire so that the barley flour is thoroughly dispersed Allow it to cool and strain through a coarse muslin cloth.

6. **Recipe**—The following recipe has been worked out on the basis of the experiments conducted in the Fruit Products Laboratories

at Lyallpur under the auspices of the Indian Council of Agricultural Research—

Barley extract	1 lb.
Lime or lemon juice	1 lb.
Sugar	2½ lbs.

7. **Mixing and preservative**—Mix the above ingredients thoroughly warming, if necessary, and add the preservative i.e. potassium metabisulphite at the rate of 5.0 grains per pound (or ½ '*masha*' per bottle of 24-26 ozs. capacity) of the finished product.

Note—The preservative which can be had from any chemical suppliers or any branch of the Imperial Chemical Industries should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it to ensure uniform mixing.

8. **Bottling and storage**—Pour the product into bottles which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes leaving a headspace of 1–1½ inches. Cork air-tight either with crown cork seal or by ordinary cork slightly wetted and pushed in. Store the bottles in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 5

Preparation & Preservation of Mango Squas

1. **Selection of fruit**—Select fresh, fully ripe, juicy type rather tart but sound fruit. The indigenous type of fruit which is inferior for table purposes or is grown in abundance yields higher percentage of juice.

2. **Preliminary treatment**—Wash the fruit thoroughly removing the stems, spray material, dirt etc.

3. **Preparation of the fruit**—Rub the fruit lightly between the palms of the two hands to thin down the pulp as best as possible.

4. **Extraction of pulp**—Remove the stem portion of the fruit and squeeze out the juice with hands covered with house-hold rubber gloves * or a small pulping machine leaving the least quantities of it with the skin and the stone.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. **Recipe**—The following recipe has been worked out on the basis of experiments conducted in the Fruit Products Laboratories, at Lyallpur under the auspices of the Indian Council of Agricultural Research :—

Pulp	1 lb.
Water	1 lb.
Sugar	1 lb.
Citric Acid	$\frac{1}{2}$ oz.
Orange yellow edible colour	Just enough to bring out attractive appearance.

6. **Mixing and preservative**—Mix the above ingredients thoroughly avoiding heating as far as possible. Strain through a coarse muslin cloth. Add the preservative i.e. potassium metabisulphite at the rate of 5.0 grains per lb. (or ½ '*masha*' per bottle of 24-26 ozs. capacity) of the prepared product.

Note—The preservative which can be had from any chemical supplier or any branch of the Imperial Chemical Industries, should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it.

7. **Bottling and storage**—Pour the product into bottles which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes, leaving a head space of 1-1½ inches. Cork air-tight either with a crown cork seal or with ordinary cork slightly wetted and pushed in. Store the bottles in a cool, dry place.

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CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 6

Preparation & Preservation of Passion Fruit Squash

1. **Selection of fruit**—Select ripe with deep yellow pulp in the inside and weighty fruit having fully developed flavour and aroma.

2. **Preliminary treatment**—Wash the fruit thoroughly in running water to remove all extraneous matter.

3. **Preparation of the fruit**—Cut the fruit into halves with sharp stainless steel knives * (and putting the fruit on a piece of wooden board).

4. **Extraction of the pulp**—With the help of scooping knives * take out the deep yellow pulp and also the small black seeds from the tough and leathery skin of the fruit. Separate the seeds from the pulp by rubbing through a 1 m.m. sieve (enamel or stainless steel or aluminium) into a clean enamelled bucket. To the residue add one-fourth its weight of water. Rub the residue in water with rubber-gloved hands to release the pulp and again strain through the sieve. Repeat this extraction process once again. Mix the three extractions and filter through a muslin cloth to remove the small seeds etc.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. **Recipe**—The following recipe has been evolved on the basis of experiments conducted in the Fruit Products Laboratories, at Lyallpur under the auspices of the Indian Council of Agricultural Research :—

Juice Extract	10 lbs.
Sugar	6 lbs.
Citric Acid	1 oz.

6. **Mixing and preservative** – Mix the above ingredients thoroughly, warming, if necessary. Strain the finished product through a muslin cloth. Add the preservative i. e. potassium metabisulhite at the rate of 5.0 grains per pound (or ½ '*masha*' per bottle of 24-26 oz. capacity) of the finished product.

Note—The preservative which can be had from any chemical suppliers or any branch of the Imperial Chemical Industries, should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it.

7. **Bottling and storage**—Pour the finished product into bottles which have been previously heated in boiling water for 15-20 minutes leaving 1″–1½″ space at the top. Cork air-tight either with crown cork seal or by ordinary cork slightly wetted and pushed in. Store the bottles in a cool, dry place.

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CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 7

Preparation & Preservation of Fruit Syrups

1. Selection of fruit—Fruits like '*Phalsa*' '*Jaman*', pomegranate and grapes can best be utilised by making thick syrups out of their juices or pulps. Fully ripe fruit free from fungal attacks should be selected.

2. Freliminary treatment—Remove stems and leaves, wash thoroughly to remove dirt and other extraneous matter.

3. Preparation of the fruit—Remove the inedible portions of the fruite i.e. the stones of '*Jaman*' the skins of pomegranate. Mash the edible parts thoroughly with rubber-gloved hands to make juice extraction easy and efficient,

4. Extraction of juice—Put the prepared fruit in a coarse cloth, wrap well, and press out the juice in a small basket press.* Take one or two more extractions with the addition of small quantities of water and warming, if necessary. Strain the mixed extractions through a coarse muslin cloth.

* Equipment of this type can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. Recipe—The following recipes have been evolved on the basis of the experimental work done in the Fruit Products Laboratories, at Lyallpur, under the auspices of the Indian Council of Agricultural Research—

Juice	1 lb.
Sugar	1 lb.
Citric acid	1/6-1/8 oz. (In Jaman and grape syrups only),

6. Mixing and preservative—Mix the above quantities of the ingredients thoroughly, warming if necessary, and strain through a coarse muslim cloth. Add the preservative i.e. sodium benzoate at the rate of 8.0 grains per lb. (1 '*masha*' per bottle of 24-26 ozs. capacity) of the finished product.

Note.—The preservative which can be had from chemists or chemical suppliers should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it.

7. Bottling and storage—Pour the finished product into bottles which have been previously heated in boiling water for 15-20 minutes leaving 1″-1½″ space at the top. Cork air-tight either with crown cork seal or by ordinary cork slightly wetted and pushed in. Store the bottles in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 8

Preparation & Preservation of Unfermented Apple Juice

1. Selection of fruit—Select fully developed (flavour and aroma) fruits even though of low grade variety or cull fruits of superior variety.

2. Preliminary treatment—Wash the fruit in a weak (1 : 20) hydrochloric acid solution to remove the arsenical and lead spray residues if any, and then wash thoroughly in running cold water, preferably in small lots at a time to remove the acid and other foreign matter.

3. Preparation of fruit—Grate the fruit in a stainless steel or tinned grater as this process facilitates the extraction of the juice without tarnishing it.

4. Extraction of the juice—Wrap the grated fruit in a thick cloth and press out the juice in a small basket type hand-worked press * and collect the juice in an enamelled or stainless steel bucket.

* Such equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi or Gladwyn and Co., Hornby Road, Bombay.

5. Heat treatment—Strain the freshly prepared juice through a thin layer of cotton wool or a coarse muslin cloth and heat rapidly to a temperature of 180°-185° F. (hot enough to touch) on direct fire in an aluminium pan. This method is based on the results of experiments carried out in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research.

6. Bottling of juice—Pour the hot juice at once into clean and hot sterilized bottles (heated in boiling water for 10-15 minutes) till it over-flows. Immediately seal air-tight with crown cork (also previously boiled in water for 2-3 minutes).

Note—It is absolutely essential that the temperature of the juice while filling and sealing as given above should not go below 180° F in any case.

7. Pasteurization—Place the bottles horizontally on the false bottom (double or four fold thick cloth being placed at the bottom) of a pan containing water at 175° F which temperature must be maintained for half an hour.

8. Cooling and storage—Remcve the bottles and after they are cooled, store in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No 9

Preparation & Preservation of Tomato Juice

1. Selection of fruit— Select fully ripe, deep red-coloured tomatoes, free from bruises and fungal attacks.

2. Preliminary treatment—Wash them thoroughly in running cold water to remove dirt and other extraneous matter.

3. Preparation of fruit—Remove the green and blemished portions with sharp and pointed stainless steel knives and cut the sound portions into small pieces.

4. Extraction of juice—Collect the prepared fruit in an aluminium or stainless steel open vessel and crush thoroughly with a wooden ladle. Cook the crushed mass for about 5 minutes, and mash it well while cooking. When it is sufficiently soft, remove it from the fire and strain through a fine mosquito net cloth or 1 m. m. mesh stainless steel sieve * rubbing with the bottom of an enamelled mug and discarding the seeds and skins.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

5. Recipe—The following recipe has been evolved on the basis of the experimental work done in the Fruit Products Laboratories at Lyallpur, under the auspices of the Indian Council of Agricultural Research :—

Common salt	....	1 lb. per 160 lbs. of juice
Sugar	....	½ lb. per 100 lbs. of juice

6. Bottling of juice—Pour the finished product into hot sterilized crown cork bottles kept in boiling water for half an hour and sealed air-tight by crown corks which have also been kept in boiling water for 2-3 minutes.

7. Pasteurization—Pasteurize the filled bottles by placing them in a vessel having a false bottom (a double or four fold thick cloth placed at the bottom of the pan) and covered with water which is kept boiling for half an hour.

8. Cooling and storage—Remove the bottles from boiling water. Let them cool and finally store in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 10

Canning & Bottling of Fruits

1. Selection of fruit—Select fresh, firm, fully developed and sound fruits. For best flavour and appearance, use only the choice fruit of uniform maturity, colour etc. If fruits have to wait, they must be kept in a cool and well ventilated place.

2. Washing—Wash the fruit thoroughly in small lots in running water or several changes of water, if possible, to remove dirt and other extraueous matter. Handle fruits carefully to avoid bruising.

3. Preparation of fruit—Prepare the fruit as described under column 3 of the table annexed.

4. Filling and syruping—Use cans and glass jars which have been previously heated in boiling water for about quarter of an hour. (*Jars should be dipped in cold water which is gradually heated to boiling to prevent breakage*). Pack desired weight * of prepared fruit. Pour boiling hot syrup leaving about ½ inch space on top of the can or jar. (*See table for strength*).

* One lb. Butter size can and pint glass jars .... 8–10 oz.
A 2½ size can .... 18–20 oz.

5. Exhausting—This means to heat the filled can or bottle (before sealing) to drive out air in the fruit tissues and helps preventing discoloration and loss of flavour during storage. For this, place the open filled cans and jars in a large kettle with boiling water about 2″ below the tops of the containers. Cover kettle, bring the water to boil till the centre of the can or jar records a temperature of 160°-170 °F. This will be accomplished in about 10 minutes.

6. Sealing—Remove cans or jars individually from water while hot. Replace any liquid spilled by adding boiling hot syrup. Place a clean lid on filled can and seal by a Home-Can Sealer * and seal jars with screw caps.

* This is a small and compact simple machine available from the Metal Box Company of India Ltd., Calcutta, who also supply tin cans for use.

7. Pateurisation—Put the sealed containers in a large pan containing hot water, its bottom being covered with a thick clean cloth (*This is done to avoid breakage of glass jars and bumping of the containers during subsequent boiling*), keeping the level of water an inch or two over the tops of containers. Cook different fruits for periods as indicated in the table (*counting time as the water comes to rolling boil*), to kill all germs, bacteria etc.

8. Cooling and storage—Cool cans quickly preferably in running cold water, take them out while they are slightly warm so that they will dry in the air. Place glass jars each separately for cooling in air taking care not to expose hot jars to cool surface, water or air draught. When cool, stack in a cool dry place.

* **Note**—(1) In case of mangoes, musk melon and papaya 5.0 grains of citric acid per lb. of syrup may be added with advantage because of the sweetness of fruit.

(2) Pack tomatoes to top. Add common salt ½ teaspoon in one lb. butter size can and pint glass jar, and 2½ teaspoons in A 2½ size can and fill with boiling hot water.

(3) The canning table has been compiled for fruits generally in this country and is based on the experimental work conducted at Lyallpur and Delhi under the auspices of the Indian Council of Agricultural Research. Some data have also been collected from the foreign literature available on the subject.

Note—All cooking times are given for work at sea-level. At higher altitudes increase the cooking time by two minutes per each 1000 ft. rise in altitude.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CANNING TIME TABLE FOR FRUITS AND TOMATOES

Sl. No.	Fruit	Methods of Preparation	Syrup strength †	Kind of can	Cooking time in minutes in boiling water—212°* Size of can: One lb. butter	A 2½	Glass Jars (pint)
1	Apricots	Halve the fruit around the pit suture, remove pit (may also be canned as wholes) ...	Heavy	Plain	25	30	20
2	Berry fruits (except straw berries)	Remove stems	Medium	Lacquered	15	20	15
3	Cherries	Remove stems and pits ...	Medium	,,	15	20	20
4	Figs	Remove stems, dip the fruit in water at 150°F. (5-10 mts) if the fruit has waxy coating ...	Heavy	,,	100	110	100
5	Grapes	Stem individual berries ...	Light	Plain	12	15	15
6	Grape fruit	Soften fruit in hot water (200 °F. for 2 to 5 mts.), remove skin of individual segments with special curved knives	Heavy	,,	20*	25*	25*
				In hot water at 180-190 °F			
7	Guava	Peel, halve or quarter, remove seedy portion-steep in 2% common salt solution. Wash before pack	Medium	Plain	25	30	30
8	Litchi	Peel fruit by hand, remove pits ..	Medium	,,	25	30	30
9	Mangoes	Peel, cut into slices of suitable size	Light	Plain or Lacquered	12	15	15
10	Melon (musk)	Peel, slice to suitable size, discard seeds	Medium	Plain	30	35	35
11	Peaches	Soften skin by dip in boling water, cool quickly in cold water. Remove skin, halve, pit and slice, if desired	Heavy or Medium	Plain	30	35	20
12	Pears	Peel, halve, and remove cores ...	Medium	,,	25	30	20
13	Pine-apples	Remove outer fibrous coating, cut transversely into ½" slices, remove eyes and core	Heavy or Medium	,,	12	15	15
14	Papaya	Peel, slice to suitable size, discard seeds	Medium	,,	35	40	35
15	Plums	Prick fruit	Medium	Lacquered	15	20	15
16	Straw-berries	Stem, add ½ cup (8 oz) sugar per 2 lbs. fruit; bring slowly to boil, let stand overnight-bring quickly to boil before packing ...	Heavy	,,	12	15	15
17	Tomatoes	Dip in boiling water for ½ minute, then dip quickly in cold water to loosen skin. Trim stem ends and green portions, if any ...	(see note)	Plain	50	55	45

† Syrup strength	Sugar (cups)	Water (cups)
Light	1	2
Medium	1	1½
Heavy	1	1

Note—From the previous page *

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 11

Canning & Bottling of Vegetables in brine

1. **Selection of material**: Select matured but slighty tender vegetables and sort them so as to be free from blemishes and rots. Where necessary grade them according to size and maturity.

2. **Preliminary treatment**: Remove the extra and unrequired portions of the vegetables. Wash thoroughly the rest of it to remove dirt, soil and other extraneous matter.

3. **Preparation of vegetable**: Prepare as for use in the home kitchen (as per instructions given in column 3 of the appendix enclosed). Grade the prepared vegetable according to the quality viz. maturity and size as best as possible.

4. **Blanching of vegetable**: The prepared vegetable after necessary sorting is wrapped in a piece of muslin cloth and then dipped in boiling water for 2-5 minutes as given in the appendix, the time depending upon the kind of vegetable and its maturity and is such that the vegetable is just soft enough to easy pricking. Remove the muslin bag from the boiling water and give a dip in cold water immediately afterwards.

Note: The boiling water used for blanching should be used for as many times as there is no frothing and should be replaced by fresh water for smoother blanching.

5. **Filling and brining**: Pack the sterilized tin cans or glass jars with sorted pieces of the blanched vegetable and arrange them in an attractive manner so as to contain the minimum weight of vegetable as under:—

For A 2½ size cans the drained weight should be 19-20 oz.
For butter size ,, ,, ,, 9½-10 oz.
For pint glass jars ,, ,, 10-11 oz.

Fill the interspace with hot 2-3% brine (common salt solution) leaving a little space (¼-⅜″) at the top.

Note: (i) The brine should be filtered through a thick cloth to remove all traces of dust etc.

(ii) In some cases e.g. peas, cauliflower etc. small quantities of sugar and citric-acid are also added to the brine.

6. Exhausting: Place the filled cans in boiling water bath with a false bottom (an open pan with 2-4 layers of thick cloth placed at its bottom) till the centre of the can records a temperature of 170°-180° F for 6-10 minutes. This time of exhaust will vary with the nature of the pack.

Note: In place of the thick cloth a small frame work of wood to serve as bottom is also very often used.

7. Closing the container: Immediately after the exhaust process is complete, the cans are sealed with a can sealer ensuring that the contents of the container are perfectly sealed off from the outside contamination. In the case of glass jars, the lids must necessarily have a rubber ring in between the mouth of the jar and the top to achieve the same object.

Note: Can sealer is a simple machine which can be had from Messers. The Metal Box Co. of India, Calcutta, who also supply empty cans. It must be tested with an empty can before being used for the filled cans as above.

8. Processing: The vegetables in the sealed containers are processed i.e. heated at 240°F corresponding to 10 lbs. pressure in a pressure cooker* for 30-60 minutes as per details given in the appendix. The processing time depends upon the size of the container, the kind of vegetable, its stage of maturity and the density of the pack.

*This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi, and Gladwyn & Co., Hornby Road, Bombay.

Note: For every 500 ft. rise in altitude the boiling point of water decreases by 1°F and hence the corresponding increase of 2 minutes in the processing time as given in the appendix should be effected.

9. Cooling: Place the cans immediately under running cold water and let the glass jars cool in the air. Finally store the product in a cool dry place.

Note: The time table for canning of non-acid vegetables in brine as given in the Appendix is based on the data collected from foreign literature and also includes the work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research.

Appendix

Canning time-table for non-acid vegetables.

Product	Preparation before canning	Minutes processed at 240°F (10 lbs steam) Tin cans No. 2	No. 2½	Kind of tin can.	Glass Jars Paint
1. Beans (Lima)	Shell - grade - boil 5 to 10.min. pack loosely.	30	30	Plain	35
2. Beans (String)	Wash - string - boil 5 min. pack - mature - beans.	25	30	,,	30
3. Beets	Wash - retain 1 inch stems-boil 15 min. slip skins - pack	30	30	Lacquerred	35
4. Brussels Sprouts	Wash - boil 15 min. - add salt - pack	25	30	Plain	30
5. Carrots	Wash - scrape - boil 5 min. pack	30	30	,,	35
6. Cauliflower	Soak in cold brine - boil 3 min. - pack	25	25	,,	30
7. Cabbage	Wash - boil 10 min. and salt pack	40	45	,,	45
8. Okra	Wash - remove cap - boil 3 min. - pack	20	25	,,	25
9. Parsnips	Wash, scrib - boil 15 min. pack	30	30	,,	35
0. Peas	Shell - grade - boil 3 to 5 min. loosely pack	40	45	,,	45
1. Potatoes sweet	Wash - boil or steam 15 min. peel - pack	115	145	,,	120
12. ,, white	Peel - blanch for 3 min. in boiling water and pack	35	40	,,	40
13. Pumpkin or Squash	Wash - cut into pieces cook until tender - mash pack	70	95	Lacquerred	75
14. Spinach or all greens	Stem in covered vessel for 15 min. or until wilted-use smallest possible amount of water - loosely pack	50	55	Plain	55
15. Turnips	Peel - slice - blanch and pack	30	30	Plain	35

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 12

Canning of Curried Vegetables

1. **Selection of material:** Select mature, tender vegetables free from blemishes and rots. Grade them according to maturity and colour as best as possible.

2. **Preliminary treatment:** Chop off the non-edible and hence undesirable portions and wash the remaining vegetable thoroughly with running cold water to remove all dust and other foreign matter, scrubbing with hands, if necessary.

3. **Preparation of vegetable:** Prepare the vegetable as for use in the home kitchen e.g. shell the pass; remove hard leaves of cauliflower and cut the flower head into flowerets of suitable size; remove the outer hard leaves of cabbage and cut into shreds of $\frac{1}{4}''$-$\frac{3}{8}''$ thickness; peel the root vegetables and cut them into slices of suitable thickness etc., etc. Then grade them according to size and quality etc., where practicable.

4. **Preparation of liquid medium (gravy):** For packing every one dozen cans, weigh the following ingredients :—

Mustard (whole)	...	$\frac{3}{4}$ oz.
Coriander (powder)	...	$\frac{3}{4}$ oz.
Red-chillies (powder)	...	$\frac{1}{2}$ to $\frac{3}{4}$ oz.
Caraway seed	...	$\frac{3}{4}$ oz.
Turmeric (powder)	...	$1\frac{1}{2}$ to $1\frac{3}{4}$ oz.
Common salt (powder)	...	$3\frac{1}{4}$ oz.
Vegetable fat (hydrogenated oil)	...	14 oz.
Water	...	As necessary.

Heat the required amount of fat in a pan to a temperature at which mustard grains added to it produce a cracking sound. At this stage put the entire quantity of mustard in the fat and fry it for a few minutes; after this add the other spices and salt and fry likewise. Add the requisite quantity of water, stir thoroughly and bring to a boil

5. Filling of cans: Fill the prepared raw vegetables in A $2\frac{1}{2}$ size cans followed by the addition of hot gravy, in proportions given as under for some typical packs: –

Combination of vegetables	Wt. of vegetables (oz.)	Wt. of gravy (spiced liquid oz.)
1. Potatoes-Cauliflower	17.0 to 17.5	10.5 to 11.0
2. Potatoes-Cauliflower-tomatoes.	19.5	8.5
3. Potatoes-Tomatoes	24.0	4.0
4. Potatoes-Peas	15.0	13.0
5. Potatoes-Peas-Cauliflower.	16.0	12.0

Note 1 : For other combinations, almost similar proportions may be used.

Note 2 : With the proportions of vegetables and gravy used as given above, the final product will comprise of about 70% solids and 30% liquid portions. If, however, a product with less or no amount of liquid portion is required, the proportion of vegetables may be increased and that of gravy decreased.

6. Exhausting and sealing: Place the filled cans in boiling water bath (with a false bottom) without any loss of time and keep them there till the temperature of the central portion of the can reaches 170°–180°F thus eliminating as much of the pocketted air inside the can as possible. Then seal immediately with a can sealer.

7. Processing (cooking and sterilization): Cook the vegetable (packed and sealed in the can) at 240°F (i.e. 10 lbs. steam pressure) in a pressure cooker for 60 to 75 minutes depending upon the size and type of container, kind and maturity of the vegetables, quantity of fat in the final product, etc., etc.

Note:: For every 500 feet rise in the altitude, the boiling point of water decreases by 1°F and hence a corresponding increase of 2 minutes in the processing time should be effected.

8. Cooling and storage: Remove the cans from the pressure cooker after releasing the pressure of steam inside. Place them immediately under running cold water till they become fairly cool, Wipe the cans dry and finally store the product in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 13

Drying of Fruits

1. **Selection of material:** Select ripe, sound fruit free from bruises and of first grade quality.

2 **Preliminary treatment:** Wash the fruit thoroughly in running cold water or with several changes of water to remove dirt and other extraneous matter.

3. **Preparation of fruit:** Prepare the fruit as given in the column III of the appendix e.g. peel, trim and cut into suitable size pieces or slices and spread it on specially constructed wooden trays-their size being 3′ x 8′ or 3′ x 6′ or 2′ x 3′ depending upon the type of the fruit used, the quantity of the fruit handled and the method of drying. Also sulphur the fruit, if necessary (as directed in column V of the appendix).

4. **Loading and drying:** The trays laden with required quantity of the fruit (column IV of the appendix) are placed singly in long rows on wooden frame work (about 1 foot above the ground level) directly in the sun in an open yard using a fine mosquito net to control the nuisance of flies, bees and wasps, etc., etc. When nearly dried they are finished in a home drier to eliminate the last traces of moisture at temperatures given in column VI of the appendix.

Note: The information contained in the appendix is based on the collection of data from foreign literature and also includes the work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research.

APPENDIX

Serial No.	Product	Preparation for Tray	lbs. per sq. ft. on Tray	Treatment on Tray	Safe finishing temperatu
I	II	III	IV	V	VI
1	Apples	Peel and core, then slice or cube.	2	Sulphur 30 minutes ...	165°F
2	Apricots	Halve and pit ...	2	Sulphur 60 minutes ...	160°F
3	Bananas	Peel, then halve length wise or slice crosswise.	1 to 2	Sulphur 30 minutes ...	160°F
4	Berries: Black, Logan and Raspberries	Sort and wash, if necessary	...	Sulphur 15 minutes ... (Optional).	150°F
5	Berries straw	Hull and sort ...	1 to 2	Sulphur 30 minutes ...	150°F
6	Cherries	Dip in boiling ½% soda solution.	2 to 3	Sulphur only white ... cherries 20 minutes	160°F
7	Dates	Wash gently and give a dip in boiling ½% caustic soda solution.	2	...	140°F
8	Figs	Wash thoroughly ...	2 to 3	Sulphur only Adriatic ... variety 1 hour.	150°F
9	Grapes, Sultana	Dip in boiling ½% lye solution then rinse.	3	Sulphur 60 minutes ...	150°F
10	Grapes, Muscat and wine varieties	Dip in boiling 2½% lye solution then rinse.	3	Sulphur 60 minutes ...	150°F
11	Peaches	Halve and pit (peeling optional).	3	Sulphur 60 minutes ...	170°F
12	Pears	Peel; halve; core (cubing optional).	2 to 3	Sulphur 30 minutes ...	160°F
13	Plums	Halve and pit ...	2 to 3	Sulphur 60 minutes ...	150°F
14	Prunes	Dip in boiling ½% lye sol.	3 to 4	...	165°F

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 14

Drying of Vegetables

1. **Selection of vegetables**—Select sound, tender, good quality vegetables free from bruises and grade them according to size, maturity and colour, as best as possible.

2. **Preliminary treatment**—Remove the inedible portions and wash thoroughly in running cold water to remove soil, dust and other extraneous matter.

3. **Preparation of vegetables**—Prepare vegetables as given in column III of the appendix and load the prepared vegetables as per directions under column IV followed by treatment on the tray as given under column V:

4. **Drying**—Although both sun-drying and dehydration can be practised with practically equal advantage for the drying of vegetables, it is more convenient and efficient to adopt the latter method, as a product of uniform quality and better appearance can be obtained thereby. Moreover the drying is done under controlled set of conditions viz., temperature of 120°–130°F or slightly more maintained by a proper adjustment of the heating system and a fairly regulated outflow of the moist air through the slits at the top.

5. **Description of the Home Drier**—A small scale dehydrator called the 'home drier' is most conveniently and efficiently used for drying vegetables at homes. It consists of a strong galvanized iron sheet box 3′x2′x3′ with a strong perforated iron sheet bottom, the sides and top of this box being enclosed in a wooden frame work. The box is supported on an iron stand $1\frac{1}{4}$′ high. A kerosene oil stove or charcoal hearth can be used for the source of heat. The moisture is let off through two slits (2′x1·5″) with collapsible metallic flaps along the length on both sides, about 4″ below the top. The drier can accommodate 7 trays($2\frac{3}{4}$′x2′). Care is taken to regulate the temperature and outflow of moisture from the drier. The finishing should be done at temperatures given in the column VI of the appendix

6. **Packing and storage**—The vegetables dried and finished as per directions given in the appendix should be put into confectionery tins and

sealed air-tight with tin or wax depending upon the length of the period of storage.

Note: The data given below are based on the work done in the Fruit Products Laboratories at Lyallpur and where necessary it has also been collected from the foreign literature.

APPENDIX

Serial No.	Product	Preparation for Tray	lbs. per sq. ft on Tray	Treatment on Tray	Safe finishing temperature
I	II	III	IV	V	VI
1	Beans, String	Prepare as for canning ...	2	Steam blanching ...	160°F
2	Beets	Prepare as for canning; slice ¼" thick.	2	...	160°F
3	Cabbage	Shred ; blanch 2 minutes in boiling 1% sodium bicarbonate sol ; rinse.	1 to 2	...	150°F
4	Carrots	Peel and cube ...	2	Blanch in steam 5 min...	150°F
5	Sweet Corn	Husk ; blanch on cob in boiling water 10 minute ; cut the cobs.	1 to 2	...	160°F
6	Onion	Peel ; slice ⅛ inch thick, dip in cold 3% brine.	1	...	140°F
7	Peas	Prepare as for canning ...	1 to 2	Steam blanching (Optional).	150°F
8	Potatoes	Peel ; slice or cube ; dip in boiling water 2 minutes.	1 to 2	Steam blanching (Optional).	150°F
9	Potatoes Sweet.	Peel, slice ¼ inch thick ...	1 to 2	Blanch in steam 5 min ...	150°F
10	Pumkin	Remove seeds ; slice or shred into thin pieces.	2	Steam blanching 4 to 5 minutes.	170°F
11	Spinach	Wash thoroughly ...	1	...	160°F
12	Tomatoes	Slice ½ inch thick, or peel and halve.	1 to 2	Sulphur 30 minutes (Optional).	150°F

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 15

Preparation of Jams

1. **Selection of fruit**—Select fully ripe fruit (colour, flavour and aroma) and if the fruit is firm and tough, allow it to stand for a day or two to develop sweetness etc. Unripe, immature fruit should not be used for this purpose.

2. **Preliminary treatment**—Wash the fruit thoroughly in running cold water to remove dust, spray material and other extraneous matter. Stems and leaves, if any, should also be removed. Trim off the bruised and blemished portions of the low grade fruit irrespective of the size and colour, and also of the cull fruit when used for the purpose.

3. **Preparation of fruit**—Remove the peels and where necessary also the stones and cores. Cut the sound portions of the remaining fruit into small pieces. If the fruit is tough and hard it may be boiled with or without added water. e.g. the rough variety of pears needs boiling with a small quantity of water. The cut or softened fruit is crushed thoroughly and mashed into a uniformly thick mass.

4. **Addition of sugar**—As a result of experiments done in the Fruit Products Laboratories, at Lyallpur, under the auspices of the Indian Council of Agricultural Research, the following recipes have been evolved :—

To sour fruits add an equal quantity of sugar by weight but to the sweeter varieties add only three fourths of sugar by weight and also citric acid at the rate of 10-15 grains per lb. of the fruit.

5. **Mixing**—Mix the ingredients thoroughly and allow the mixture to stand for ½-1 hour so that the sugar gets dissolved in the fruit juice, released from the fruit as a result of mixing it with sugar.

6. **Cooking**—Cook the mixture on a medium fire with occasional stirring and crushing till the temperature reaches 222°F at sea level or the cooking mass approaches the desired consistency.

Note: For every 500 ft. rise in the altitude a decrease of 1°F should be effected in the above cooking temperature of 222°F.

7. **Filling and closing**—Put the boiling hot jam into sterilized jars or cans (done by putting the containers into water and heating the same for 10-15 minutes), and cap or seal immediately.

8. **Cooling and storage**—Immediately after pouring the hot product the containers should be inverted for about 5 minutes to sterilize the lid. Allow them to cool and then store in a cool, dry place.

Note. To prevent breakage of glass containers at the time of pouring boiling hot product an insulating material e.g. wooden board, or dry cloth should be placed underneath them.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 16

Preparation of Mango & other Preserves

1. **Selection of fruit**—Select fully developed, firm but slightly under-ripe fruit (judged from the pulp-being pale yellow in colour). Fruits with loose pulp even though under-ripe should be discarded.

2. **Preliminary treatment**—Wash thoroughly to remove dust, soil, spray material etc., by scrubbing with hands and washing.

3. **Preparation of the fruit**—Remove the peel with sharp stainless steel knives* and cut large and good looking slices. Care should be taken that the peeled slices are left in brine solution or in water as otherwise the slices would turn black.

*This type of equipment can be had from food machinery dealers like Messrs Gardners Corporation, Connaught Circus, New Delhi, and Gladwyn & Co., Hornby Road, Bombay.

4. **Blanching**—This method is based on the results of experiments carried out in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research. Wrap the prepared slices in a piece of muslin cloth and give them a dip in boiling water for 5-10 minutes so that the slices become softer and are easy to prick. Spread the slices on a clean piece of cloth and puncture with forks or bamboo prickers.

5. **Preparation of syrup**—Take sugar equal in weight to that of the prepared slices and make a syrup by boiling it with 1:3 of water and a little citric acid (at the rate of 10-15 grains per lb. of sugar used).

6. **Cooking**—Add the slices to the syrup when it has become thicker. Cover the contents with the lid and heat again till the temperature of the syrup reaches 224°-225°F (at sea-level) or when the syrup drawn between the two fingers is thick enough to give 3-4 threads.

Note: For every 500 feet rise in the altitude, the temperature of cooking as given above should be reduced by 1°F.

7. **Packing and storage**—Allow the product to cool and then transfer it into sterilized and dry glazed or glass jars.

Note: Preserves of apple and other fruits and also that of carrots can be prepared in the same manner.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No 17

Preparation of 'Petha' Candy

1. **Selection of material:** Select sound, fully ripe fruit, free from blemishes and rots and tough to touch.

2. **Preliminary treatment:** Wash it well to remove soil and other extraneous matters

3. **Preparation of fruit:** Cut the fruit longitudinally into slices and remove the seeds and inner soft pulp. Carefully peel off the outer hard surface with sharp stainless steel knives and cut the peeled slices into cubes or pieces of any desired shape and size.

4. **Lime water treatment:** The cubes or pieces of *petha* are pricked with stainless steel forks or bamboo prickers and kept in fresh lime water (Prepared from an ounce of quick lime added to about a lb of water which is vigorously stirred and allowed to settle and finally decanted and filtered). Sufficient quantity of this lime water is prepared so as to cover the entire lot of the prepared fruit. These pieces are left there for 3-4 hours depending upon the softness of the fruit–the softer the fruit, the longer is the period for which it is left.

5. **Washing:** Drain off the lime water and wash the fruit pieces thoroughly in fresh, running water.

6. **Blanching:** Place the prepared pieces in boiling water for about 15-30 minutes so as to make them slightly soft and capable of taking up sugar from the syrup. Drain off the water and spread the pieces on a clean white sheet to dry off some of the moisture.

7. **Preparation of syrup**: Prepare the sugar syrup by dissolving 2 parts of sugar in 3 parts of water, heating to a boil, removing the scum and finally filtering through a thick cloth to get clear syrup. The quantity of syrup prepared should be equal to double the quantity of the prepared fruit.

8. **Cooking**: Add the fruit pieces to the boiling syrup and continue the heating process till the temperature reaches 224°F (at sea-level) or the syrup becomes sufficiently thick so as to draw into 2 or 3 threads when put between the two fingers.

Note: For every 500 feet rise in the altitude, a decrease of 1°F in the above cooking temperature should be effected.

9. **Packing and storage**: Allow the whole mass to stand for overnight and then drain off the syrup through an enamelled sieve. Add some suitable essence and store it in a clean dry glass or glazed container.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 18

Preparation of Guava Jelly

1. **Selection of material:** Select sound, firm and rather tart fruits free from blemishes. Soft fruit does not posses the setting property and hence should be avoided as far as possible.

2. **Preliminary treatment:** Wash the fruit thoroughly under running cold water scrubbing with hands where necessary.

3. **Preparation of fruit:** Cut the washed fruit with stainless steel knives (the ordinary knives stain the fruit black and thus make the product unattractive) into small pieces and cover it with water adding citric acid at the rate of 10-15 grains per pound of the fruit.

4. **Extraction of pectin:** The method is based on the work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research. Boil the mass for about half an hour with occasional crushing with a wooden ladle till the extract shows good stickiness. Put the mass in a coarse cloth and separate the extract. Add to the pomace one fourth its weight of water and take another extraction. Get a similar extraction once again. Stain the extracts and then keep the mixed extracts over-night for settling in a deep container.

5. **Testing of pectin:** Decant the clear extract carefully. To a teaspoonful of this clear extract add two teaspoonfuls of methylated spirit. The formation of one big clot indicates that the extract is rich in pectin, whereas slightly smaller clots indicate that the pectin content of the extract is medium and the formation of a thin gelatinous mass with very small clots shows that the extract is poor in pectin.

6. **Addition of sugar:** To every cup of the clear extract add $\frac{3}{4}$ to $\frac{1}{2}$ cup of sugar respectively according as the extract contains rich or medium pectin. In case the extract is poor in pectin, concentrate the same till it gives a good pectin test and then add the requisite quantity of sugar.

7. **Cooking:** Cook the mixture till the mass boils at 222°F at sea-level or till it gives a sheeting test i.e., if it is held in the spoon it starts dropping in the form of flakes and not in drops.

Note: For every 500 ft. rise in altitude the boiling point of water falls by 1°F and a corresponding decrease may be effected in cooking temperature.

8. **Packing and storage:** Pour the finished product into clean dried sterlized glass jars keeping a wooden board below. (*This prevents breaking of glass containers when hot product is poured into them*). Let the product cool and then, seal air-tight.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 19

Preparation of Orange Marmalade

1. **Selection of fruit**—'*Maltas*' (Tight skin oranges) and '*Khattas*' (rough lemons) are suitable fruits for proper acidity and pectin. Even fruits of inferior quality but sound otherwise (*i.e.* lacking in their normal juice content) can be used for the purpose. Two '*Maltas*' are used for every one '*Khatta*'.

2. **Preliminary treatement**—Wash the fruits thoroughly to remove dust, sprays, etc., in cold running water.

3. **Preparation of fruit**—The method described below is based on the experimental work done in the Fruit Products Labroatories at Lyallpur under the auspices of the Indian Council of Agricultural Research. Carefully peel off the outer thin portion of the fruit with sharp, stainless peeling knives leaving as much of the albido portion intact as possible. Preserve the peel of about one third to one fourth the number of oranges for shreds, etc.

4. **Shredding of slices**—The peels of tight skin oranges preserved for shreds are cut into fine shreds with sharp cutting knives and then boiled in sufficient quantity of water for about 10 minutes and changing the water 2 or 3 times, if necessary.

5. **Extraction of pectin**—Slice the peeled fruit into thin slices and add enough water to cover the same. Then cook the mass for about half an hour with occasional crushing by means of a wooden ladle till the extract shows good stickiness. Strain the hot pulpy extract through a coarse muslim cloth. To the pomace add $\frac{1}{3}$ to $\frac{1}{4}$ quantity of water and take the second and similarly, if possible, the third extraction. Mix all the three extracts together and discard the residual fruit pulp. Keep the mixed extract over-night for sedimentation in a deep vessel.

6. **Testing of pectin**—To a teasponful of the clear extract add two teaspoonfuls of methylated or rectified spirit. Formation of one big clot indicates the extract to be rich in pectin but small though many clots indicate medium pectin and a thin gelatinous precepitate shows poor pectin.

7. **Addition of sugar**—To every cup of the clear extract add ½ and ¾ cup of sugar respectively if the extract contains rich or medium pectin. In case, however, the extract is poor in pectin, concentrate the same till it gives good pectin test and then add the requisite quantity of sugar.

8. **Cooking**—Cook the mixture to 218°F (this temperature is reached just about 15-20 minutes before the end point at sea-level) and add the boiled shreds of the orange peel. Continue boiling till the temperature reaches 222°F or the product gives the sheeting test viz., it falls from the ladle in the form of flakes and not drops.

Note—For every 500 ft. rise in altitude a decrease of 1°F should be effected in the above cooking temperature.

9. **Packing and storage**—Pour the product into clean, dry, sterilized glass jars and seal them air-tight after cooling. Store in a cool dry place.

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CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 20

Preparation of Sweet Mango Chutney

1. **Selection of material**—Select unripe but fully developed fruit with the inner pulp turned yellow. The fruit should, as far as possible, be firm.

2. **Preliminary treatment**—Wash the fruit carefully preferably by rubbing with the hands.

3. **Preparation of fruit**—Peel the outer green skin of the fruit with sharp stainless steel knives and grate the peeled fruit on a grater into fine slices.

Note—For sliced mango chutney to be prepared out of the season, slices of peeled mangoes can be stored in 6% salt solution in closed containers for as long a period as 5-6 months, subsequent steps being just the same.

4. **Recipe**—The following recipe has been evolved as a result of experiments carried out in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research :—

(i)	Slices	1 lb.
(ii)	Sugar	1 lb.
(iii)	Salt	¾ oz.
(iv)	Spices (cardamom, cinnamom, etc.)	½ oz.
(v)	Red chillies	¼ oz.
(vi)	Ginger	¼ oz.
(vii)	Onions (chopped)	1 oz.
(viii)	Garlic (,,)	¼ oz.
(ix)	Vinegar (good quality)	3 oz.

5. **Addition of sugar**—Add sugar and salt in the proportions prescribed above to the slices which have been warmed with a little of water to make them slightly soft. The mixture is left to sweat so that the added sugar and salt get dissolved in the juice excreted by the fruit.

6. **Cooking**—After sugar and salt have dissolved, the mixture is put on the fire and the spices, etc. (i.e. items iv-viii tied loosely in a muslin bag) are added and heating continued with occassional stirring till the mixture thickens sufficiently. Thereafter, the muslim bag is removed and squeezed to extract the flavour and aroma of the spices, etc. Vinegar in the prescribed proportions is added to the product at this stage and the heating continued till a product of desired consistency is obtained.

7. **Packing and storage**—The product is allowed to cool a little and then poured into clean, sterilized, wide mouthed bottles which are then allowed to cool in the air and capped or into clean dry glazed jars and covered.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 21

Preparation of Guava Cheese

1. **Selection of material**—Select sound and fully ripe fruit of the best quality and firm in texture.

2. **Preliminary treatment**—Wash the fruit thoroughly to remove dirt soil etc. by scrubbing the fruit with hands if necessary.

3. **Preparation of fruit**: Trim the bruised and blemished portions, if any, and cut the sound portions of the fruit into small pieces with stainless steel cutting knives * as the ordinary knives stain it black.

* Equipment of this type can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi andGladwyn & Co., Hornby Road, Bombay.

4. **Extraction of pulp**: Add an equal quantity of water and boil till the fruit softens well. Strain the pulp through a fine mosquito net cloth to separate the seeds and rough skins.

5. **Recipe**: The following recipe has been evolved on the basis of the experimental work carried out in the Fruit Products Laboratories at Lyallpur and Delhi under the auspices of the Indian Council of Agricultural Research :—

(i)	Pulp	1 lb.
(ii)	Sugar	1½ lbs.
(iii)	Butter	2 oz.
(iv)	Citric acid	1 gram.
(v)	Salt	½ teaspoonful
(vi)	Colour (red edible)	Sufficient to give an attractive deep fruit colour to the product.

6. **Cooking :** Mix the ingredients (i) to (iii) and heat till the mass becomes sufficiently thick. Add the remaining ingredients dissolved in a small quantity of water just before finishing.

7. **Finishing of the product :** Smear a china plate with butter and spread the finished product over it to form about $\frac{1}{4}''$ thick layer. Allow the product to cool and set and then cut into pieces of attractive shape. Wrap in butter paper and store in a clean, dry glass container which is finally sealed with wax.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 22

Preparation of Tomato Ketchup

1. **Selection of material**—Select fully ripe deep red coloured tomatoes free from bruises.

2. **Preliminary treatment—**Wash thoroughly to remove dirt, soil and other extraneous matter.

3. **Preparation of material**—Trim off the blemished as well as the green or yellow portions of the fruit and cut into small pieces. Crush them with a wooden ladle to facilitate easy extraction of the pulp.

4. **Extraction of the pulp**—Heat the crushed mass to boiling and let it boil for 3-5 minutes Strain it through 1 m.m. mesh sieve rubbing with the bottom of an enamelled cup to press out completely the pulp, and rejecting the seeds and skins.

5. **Recipes**—As a result of experiments carried out in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research, the following recipe has been evolved for use in every 6 gallons of pulp as obtained in item (4) above.

(i)	Onions (chopped)	15 oz.
(ii)	Garlic (chopped)	1 oz.
(iii)	Cloves (whole)	½ oz.
(iv)	Spices (coarsely powdered cardamom, black pepper, *zira* in equal quantity)	½ oz.
(v)	Mace (*Jalvatri* not ground)	⅛ oz.
(vi)	Cinnamon	¾ oz.
(vii)	Red Chillies	½ oz.
(viii)	Salt	12 oz.
(ix)	Sugar	2 lb.
(x)	Vinegar (good quality)	2 bottles (26 ozs.)

6. **Heating**—To the pulp add the spices i.e. items i-vii (loosely tied in a muslin bag) and one third the quantity of sugar and heat the mass till it thickens to approximately one third of its original volume, when the muslin bag is removed and squeezed to extract the flavour and aroma of the spices. Thereafter the requisite quantity of vinegar, salt and the remainder quantity of the sugar are added and mass heated for another few minutes so that the volume of the finished product is about one third that of the original pulp.

7. **Addition of preservative**–To a small quantity of the finished product is added the preservative i.e. sodium benzoate at the rate of 2 grains per lb. of the finished product and thoroughly mixed. This quantity of the finished product is then uniformly mixed with the rest of the product before packing.

8. **Bottling and pasteurization**—The finished product is poured into 12 oz. sterilized bottles, sealed air-tight with a crown seal and then pasteurized in boiling water for 30 minutes.

Note—The crown-corking machine can be had from machinery dealers like Messrs. Gardners Corporation, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

9. **Cooling and storage**—The bottles are cooled in air and stored in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 23

Preparation of Mango Leather

1. **Selection of material**—Select fully ripe fruit of the sucking variety having deep, scarlet-yellow pulp and yielding a high percentage of juice. Over-ripe and even partially rotten fruit should be discarded as it imparts an unpleasant flavour to the product.

2. **Preliminary treatment**—Wash the fruit thoroughly in cold water preferably by scrubbing with hands to remove the deposits of juice stains.

3. **Extraction of the pulp**—Rub the fruit in between the two hands so as to thin down the pulp. Remove the stalk end and squeeze out the pulp with gloved hands leaving the minimum possible quantities of it with the skin and the stone of the fruit. Strain the pulp through a fine mosquito net cloth to remove the coarser particles of pulp and for a uniform mixing of the same.

4. **Traying of the pulp**—The uniformly mashed pulp of the fruit is spread in very thin layers on trays $2\frac{3}{4}'$x$2'$ made of copper or brass, the inside of it having been tinned to avoid corrosion. The inside bottom of the trays is covered with sheets of buttered, glazed paper to avoid sticking.

5. **Drying**—The trays are placed in the sun for drying but are covered with fine netting to keep off insects, etc. When the first layer of the juice has dried, another layer of the fruit-pulp is put thereon to dry in the same manner. This process is repeated until a sufficiently thick layer, say, $\frac{1}{4}''$-$\frac{1}{2}''$ of the dried pulp, which resembles more or less the texture of leather, is obtained.

6. **Sulphuring of the product**—Expose the product to sulphur fumes obtained by burning a small quantity of sulphur, (depending upon the weight of the product), at the bottom of a closed box. This treatment helps in the product retaining its attractive colour for a considerable period.

7. **Packing and storage**—The sheets of mango leather are cut into pieces of suitable size and shape and then wrapped in butter paper and finally packed in glass jars for storage.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 24

Preparation of Sweet Turnip Pickle

1. **Selection of material**—Select tender and sound turnips of good quality having almost uniform size and maturity.

2. **Preliminary treatment**—Chop off the inedible leaves of turnips and wash the remaining thoroughly in running cold water to remove dirt and other extraneous matter.

3. **Preparation of material**—Peel the rough thick outer portion of the vegetable and cut them into $\frac{1}{4}''$-$\frac{1}{2}''$ thick round slices.

4 **Recipe**—The following recipe has been worked out in the Fruit Products Laboratories at Lyallpur, under the auspices of the Indian Council of Agricultural Research :—

(i)	Turnip slices	20 lbs.
(ii)	Red chillies	8 ozs.
(iii)	Black pepper	4 ozs.
(vi)	Mustard	1 lb.
(v)	Spices (caraway and cinnamon)	2 oz.
(vi)	Dried dates (*Chhoara*)	8 oz.
(vii)	Tamarind (*Imli*)	8 oz.
(viii)	Ginger (fresh-chopped)	8 oz.
(ix)	Onions (,,)	2 lbs.
(x)	Garlic (,,)	4 oz.
(xi)	Salt (powdered)	2 lbs.
(xii)	Vinegar	1 Bot. (26 ozs.)
(xiii)	'*Gur*'	$1\frac{1}{4}$ lbs.
(xiv)	Rape seed oil (*Sarson oil*)	2 lbs.

5. **Method of mixing ingredients**—Fry the chopped ginger, onion and garlic in a small quantity of oil.

(*a*) Prepare a thick extract of the tamarind (soaked over-night) discarding seeds, stems etc. and cut the dried dates (*Choara*) into small pieces.

(*b*) Mix all the ingredients except "*Gur*" and rape seed oil with the turnip slices and pack the mass in a glass or glazed container which is then placed in the sun for 3–4 days till characteristic pickle flavour is developed.

(*c*) Add a clarified thick syrup of "*Gur*" or jaggery to the pickle and leave in the sun for another 2-3 days.

(*d*) Finally add rape seed oil (previously heated and cooled) and keep the pickle in the sun for another 3-4 days till the slices have become sufficiently soft and palatable and the flavour and aroma of the pickle sufficiently enriched.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 25

Preparation of Mango Pickle in Oil

1. **Selection of material**—Take under-ripe but fully developed, preferably tart variety of mangoes but free from blemishes and rots.

2. **Preliminary treatment**—Wash the fruit thoroughly by scrubbing with the hands to remove dirt and spray material.

3. **Preparation of fruit**—Slice the fruit longitudinally using stainless steel knives * and discard the stones. Leave the slices in 2-3% brine solution to avoid blackening of the cut surfaces.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

4. **Recipe**—The following recipe has been standardised in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research :—

(i)	Peeled and sliced fruit	2 lbs.
(ii)	Common salt (powdered)	8 oz.
(iii)	Fennugreek (*Metha*) coarsely ground	4 oz.
(vi)	Nigella (*Kalaunji*) coarsely ground	1 oz.
(v)	Turmeric (powdered)	1 oz.
(vi)	Red chillies (powdered)	1 oz.
(vii)	Black pepper	1 oz.
(viii)	Fennel or aniseed (*Saunf*)	1 oz.
(x)	*Sarson* oil (moisture free)	Sufficient to keep the surface covered with oil layer.

5. **Mixing**—Mix the mango slices with requisite quantity of powdered common salt and shake them well. Put the mass in a glass or glazed jar and leave it in the sun for 4-5 days until the fruit slices sweat and the green surface of their skin becomes pale yellow in colour. Thereafter all the ingredients are mixed with the solid slices and smeared with a little of moisture-free oil.

6. **Packing and storage**—The pickle is packed into clean, dry glass or glazed jars and the mass thoroughly pressed to leave no air-pocket inside. Moisture-free oil sufficient to leave a small layer at the top is added and the product stored for 2-3 weeks before use. During the period it is examined after every 2-3 days and more oil is added, if necessary.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 26

Preparation of Lime & Green Chilli Pickle

1. **Selection of material**— Select sound, fully mature (with deep yellow skin), juicy limes and good size local green chillies. If the limes are a bit greenish in appearance they should be allowed to develop deep yellow colour before being put to use.

2. **Preliminary treatment**—Wash the limes and the chillies thoroughly in running cold water.

3. **Preparation of material**--Remove the stocks of green chillies without injuring their caps and cut the limes into halves or quarters depending on their size.

4. **Recipe**—The following recipe has been evolved on the basis of the experimental work carried out in the Fruit Products Laboratories at Lyallpur and Delhi under the auspices of the Indian Council of Agricultural Research. For every pound of limes and green chillies used, weigh out four ounces of powdered salt and put it in a clean, sterilized wide mouthed glass or glazed jar. Partially squeeze the juice of limes over that salt and put the partially squeezed limes on to the same. Similarly give deep longitudinal incisions into the green chillies individually and add them to the same jar. Stir the mass well so as to effect a thorough mixing. If the juice of the limes does not cover the entire mass, add boiled but cooled water acidified with citric acid (4-5%) so that the limes and the chillies are covered with the liquid.

5. **Further treatment**—Keep the mass in the sun with occasional shakings for about a week or so, so that the limes get softened (indicated by their skin turning light brown and the chillies turning from green to brown). The pickle at that stage is ready for use.

Note—Care should be taken to keep off moisture from the pickle which otherwise would get mouldy and spoiled.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 27

Preparation & Preservation of Spiced Carrot Juice

1. **Selection of material**—Select sound, well matured, sweet in taste carrots of the black variety.

2. **Preliminary treatment**—Wash the carrots thoroughly by scrubbing in between the hands and removing the hairy parts thereof.

3. **Preparation of material**—Chop off the two ends and then scrape the body to remove the inedible portions completely. Grate the prepared material on a grater.

4. **Recipe**—As a result of the experiments conducted at the Indian Institute of Fruit Technology, Delhi under the auspices of the Indian Council of Agricultural Research, the following recipe has been evolved :—

(i)	Grated carrots	20 lbs.
(ii)	Common salt	$10\frac{1}{2}$ oz.
(iii)	Mustard (powdered)	1 oz.
(iv)	High quality vinegar	20 oz.
(v)	Red chillies	2 teaspoonful

Mix the above ingredients thoroughly and pack in earthen-ware pitchers to the brim and cover them with their lids. Apply parafin wax all round the lids leaving a small opening on one side to let off the gases produced inside the pitchers and stored in a cool, dry place for a month or so.

5. **Lactic fermentation**—When the mass has developed sufficient kick characteristic of the lactic acid the juice is pressed out from the mass with the help of rubber-gloved hands and a coarse muslin cloth.

6. **Clarification**—Allow the strained juice to stand in closed and deep containers for couple of days when the sediment separates from the clear juice which is syphoned and filtered through a fine muslin cloth.

7. **Addition of preservative**—Add the preservative i.e. a mixture of potassium metabisulphite and sodium benzoate at the rate of 2.5 grains each for every pound of the beverage and mix thoroughly.

Note—The preservatives which can be had from any chemical suppliers be dissolved in a small quantity of water or the product and mixed with the rest thoroughly.

8. **Bottling and storage**—Fill the clear juice in bottles previously sterilized in boiling water for 10-15 minutes. Cork tightly or crown seal the bottles. Store in a cool, dry place.

Note—Before use, the beverage should be diluted 2-3 times with water.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 28

Preparation & Preservation of Apple Cider

1. **Selection of material**—Select apples (fully developed in flavour and aroma) of 'Baldwin' and 'Yellow Newton Pippan' varieties having characteristic high tannin content and therefore ideally suited for cider making.

2. **Preliminary treatment**—Wash in a weak 1:20 hydrochloric acid solution to remove all arsenic and lead spray residues, if any. Again wash the fruit in running cold water to remove the acid and other foreign matter.

3. **Preparation of fruit**—* The method described below for the preparation of apple cider is based on the work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research. Grate the fruit on a grater and press the juice out of the crushed mass (wrapped in a strong cloth) with a small basket type handworked press, * collecting the juice in an enamelled or stainless steel bucket or aluminium pans to avoid corrosion of the vessel and metallic contamination of the juice.

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

4. **Clarification**—Strain the freshly prepared juice through a thin layer of cotton wool to remove the coarse particles of fruit tissues.

5. **Fermentation**—Collect the fresh juice in a glass carboy or winchester bottle adding potassium metabisulphite at the rate of 1.5 grains per pound of the juice and sugar to raise the density of the juice to 22° Brix followed by pure wine yeast to effect fermentation. The mouth of the carboy is kept plugged with cotton wool and the temperature maintained

between 65 and 70 °F. If the fermentation becomes sluggish the yeast nutrient viz., ammonium hydrogen phosphate at the rate ·02-.05%. is added.

6. **Packing of cider**—When the fermentation is complete (shown by the brix density of the juice indicating 0 or 1%) the fermented juice called the cider is allowed to stand so as to settle the sediment (sedimentation being brought about more effectively by the yeast). This process of racking is repeated a number of time till a clear liquid is obtained which is then filtered through a number of layers of fine cloth.

7. **Aging**—The characteristic kick of the apple cider is acquired by keeping the fermented and racked juice either in an oakwood vessel or steeping oakwood shavings in it.

8 **Pasteurization**—The prepared cider is pasteurized at 180°F to coagulate the heat-coagulable proteins, cooled and filtered nicely.

9. **Carbonation and bottling**—The clear filtered cider is carbonated under 10-15 lbs. pressure of carbon dioxide in pressure resistant bottles.

10. **Pasteurization**—The filled bottles are pasteurized at 140°F for 30 minutes using a false bottom to avoid incidences of breakage of bottle etc.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 29

Preparation & Preservation of Grape Wine

1. **Selection of material:** Select ripe, fresh grapes and remove the blemished portions, if any.

2. **Extraction of juice:** Crush the grapes as such and extract the juice by putting them in a thick cheese cloth, and pressing the same in a small screw type basket press, * thereby getting the maximum yield of the juice.

* This method has been worked out on the basis of the work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research.

3. **Pasteurization of juice:** The juice containing the coarser pulp of the fruit is pasteurized at a temperature of 140°-150°F for about 30 minutes which process helps to inactivate the wild yeast flora to some extent in settling the dirt etc.

4. **Alcoholic fermentation:** The following method has been worked out on the basis of work done in the Fruit Products Laboratories at Lyallpur under the auspices of the Indian Council of Agricultural Research :

Syphon off the clear juice into a clean carboy and adjust the sugar content (Brix reading) of the juice to 23° Brix either by the addition of sugar, if the original content is low, or by diluting the same, if it is high. To the culture bottle of pure strain of *Saccharomyces Eilipsoideus Var. Burgandy* (which can be had from any recognized bacteriological laboratory) add about 3-4 ounces of pasteurized juice (just sufficient to cover the agar slant on which rests the culture) under sterile conditions, so that wild flora do not get into the culture bottle. Allow the organisms to multiply. After

2 hours a frothing on the surface of the juice will appear indicating that the fermentation is complete. This fermented juice is poured into a similarly pasteurized juice in the ratio of 1 : 10 which in another 24 hours will be completely fermented so that further multiplications are carried out in the same proportions at a temperature maintained between 80°-85°F. When, however the fermentation slackens the aeration of the fermenting juice is carried out by means of an air-pump (only filtered air free from wild flora being admitted for the purpose.) The fermentation process takes about 21 days when all the sugars get converted into alcohol.

5. **Racking:** The wine is racked by syphoning out the clear supernatant liquid and discarding the precipitate which is largely yeast and other organic matter. This process is repeated a number of times by sealing the syphoned wine in air-tight containers and observing the accumulation of a sediment during the course of storage.

6. **Aging:** To the fairly clear wine are added oakwood shavings, which through oxidation impart an agreeable oaky flavour during the course of storage for a year or even more.

7. **Bottling and pasteurization:** The wine when ready is bottled and pasteurized at 140°-150°F for 30 minutes.

Note—Dry wines represent an almost complete fermentation of all sugars in the original juice whereas the sweet wines are those where the fermentation is arrested in the middle so as to retain a part of the original sugars of the juice. The alcoholic content of either wines ranges from 7-20%. Usually wines containing more than 12% alcohol are fortified with high class fruit brandy preferably made from the fruit used for making the wine itself.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 30

Preparation of Vinegar

1. **Material**: Third grade fruit i.e. windfalls, blemished fruits (grapes, apples, oranges, mangoes, dates and in fact any sweet fruit the juice of which contains 10-20% sugar and also the sugar cane juice) or even cores or peels of fruit which are normally discarded during the process of canning or jam making are utilized for vinegar making.

2. **Extraction of juice**: In the case of fruits the juice is extracted by washing the fruit, crushing it thoroughly, adding a small quantity of water and heating, if necessary, and then pressing out the same in a basket type press. *

* This type of equipment can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

3. **Adjustment of sugar**: The amount of sugar present in the juice is determined by a Brix hydrometer and the same adjusted to 12-15% sugar either by diluting the juice with water, if it contains excessive amount of sugar or by adding extra sugar to it, if it is deficient in sugar.

4. **Fermentation**: The juice is heated to almost boiling point, to destory all the micro-organisms and then transferred to a previously sterilized glass carboy filling it three fourths and adding a small cake of pure wine yeast, (obtainable from any winery) to ferment the juice. The mouth of the carboy is plugged with cotton wool which allows the gases to escape with frequent stirrings and maintaining the temperature between 80°-85°F as best as possible.

5. **Acetification:** When all the sugars disappear (tested with a Brix hydrometer showing 0° or 1° Brix), the fermented juice is stored for 1-2 weeks for sedimentation. Then the clear liquid is syphoned into a clean carboy (three-fourths full) to which is added unpasteurized mother vinegar in the ratio 1:10 giving maximum aeration to increase the vigour of fermentation by putting two holes in the cork at the top of the carboy. A film of vinegar bacteria is formed on the surface of the fermented liquid which should not be disturbed and the temperature should be maintained at 70°-80°F as best as possible. This fermentation should be complete in 8-10 weeks when the vinegar is syphoned off and filtered through several thicknesses of cloth.

6. **Bottling and pasteurization:** The clear vinegar is poured into sterilized bottles, corked air-tight and then pasteurized in hot water at 160°-170°F for 15-20 minutes.

7. **Aging:** The bottled product is left for aging which improves the quality (flavour and aroma) and the clear vinegar rebottled and pasteurized before use.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 31

Serial No.	Name of the Article	Quantity or No.	Approx Price
			Rs.
1	Balance with small weights of 'tola' 'masha' ...	One	10
2	Basket Press, laboratory type	One	100
3	Basins (enamelled)	12	50
4	Bottles (different sizes) according to requirements	...	...
5	Brushes (Bottle cleaning)	6	2
6	Buckets (enamelled)	4	60
7	Do (G.I.)	6	30
8	Can and Cork opener	2	1
9	Cans (reformed)—(30oz., 16 oz. butter, 16 oz. milk) according to requirements.	...	...
10	Can sealer (Dixie type) with spare parts ...	One	250
11	Carboys (glas) 40 lbs. capacity	One	50
12	Citric acid according to requirements ...	Per lb	3
13	Citrus oil extracting plate	One	50
14	Colours (edible)	2-3 oz	1
15	Cooking pans (Aluminium)	6	20
16	Corks ordinary according to requirementa and size	...	...
17	Crown corks do do ...	...	...
18	Crown corking machine	One	100
19	Cups (enamelled)	2	5
20	Cylinders (graduated)	3	10
21	Do (ungraduated)	3	10
22	Essences and Essential Oils (according to requirements).	...	...
23	Family balance	One	50
24	Funnels (enamelled)	Two	3
25	Glass jars (screw cap) according to requirements ...	...	...
26	Gloves (rubber)	4 pairs	15
27	Hearths (charcoal)	Two	8
28	Home Drier (cabinet type 3'x2'x3') with six spare trays.	One	400
29	Hydrometers (brix)—all ranges from 0°—90° ...	One set	75
30	Ladles (wooden)	6	5
31	Lime Juice squeezers	1 doz.	10
32	Mix-Master (juice extractor and mixer) ...	One	300
33	Plates (enamelled)	6	10

Serial No.	Name of the Article	Quantity or No.	Approx Price
			Rs.
34	Potassium metabisulphite (according to require- ... ments).	Per lb.	7
35	Pressure cooker (Burpee type)	One	300
36	Salometer	One	15
37	Screw type juice extractors	Two	100
38	Sieves (1 mm mesh)	Two	5
39	Sodium benzoate according to requirements ...	Per lb.	4
40	Spirit lamps	Two	10
41	Spirit (methylated or rectified)	1 lb.	2
42	Stainless Steel knives (cutting peeling, coring and pitting).	1 doz. each	150
43	Stove (kerosine, Primus)	One	15
44	Stove (Electric)	One	15
45	Thermometers	Two	30
46	Tumblers (glass)	Six	3
47	Vacuum guage	One	40

Note.—1. Prices, as given above, are only approximate in view of the fact that they will keep on changing.

2. Cans and sealing equipment can be secured from the Metal Box Co., of India Calcutta, or through any of the branches in Madras, Bombay or Delhi.
3. Items of machinery including knives, etc., can be hand from Food Machinery Suppliers like Messrs. Gladwyn & Co., Hornby Road, Bombay or Gardners Corporation, Connaught Circus, New Delhi.
4. Chemicals and Laboratory equipment may be available form all Scientific stores.
5. Other items of every day use can be purchased from Hardware or General merchants in the local market.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 32

Preparation & uses of Banana Chips

1. **Selection of material:** Select sound raw bananas, free from injuries and with as little sugary taste as possible. Any variety may be used for the purpose.

2. **Preliminary treatment:** Washing is not necessary, but dirt and other extraneous matter sticking to the fruit may be removed by rubbing with a piece of wet cloth.

3. **Preparation:** Peel the fruit by hand after giving three or four longitudinal cuts to the peel with a sharp stainless steel knife. Remove the end tips and cut the peeled fruit into slices, 1/8″-3/16″ thick, with a sharp stainless steel knife or a mechanical slicer. *Use of any equipment of ordinary steel for slicing will stain the fruit black and should, therefore, be avoided.* Keep the peeled fruit as well as the slices immersed in water or preferably in a solution of 0.1% citric acid or tartaric acid, 0.05% hydrochloric acid or 0.1% potassium metabisulphite to avoid browning.

4. **Sulphuring:** Remove the slices from the medium in which they were kept, give them a wash in cold water, drain and spread on wooden slat bottom trays at ½-1 lb. per sq. foot of tray surface. Trays made of deal wood strips are suitable, but even trays of bamboo sticks may be used for the purpose. At this stage, sulphuring may be done to improve the quality of the product. For sulphuring, the slices on the trays may be exposed for one hour to fumes of sulphur dioxide, by burning sulphur in a special chamber called sulphur box. About ¼ tola of sulphur may be burnt for one charge of the sulphur box holding 10 trays.

Note 1: The Sulphur Box is a closed airtight cup-board-like box made of galvanized iron sheet, fitted in a wooden framework and having runaways on both sides to hold the

trays. The size convenient for small-scale work is 3′ x 2′ x 3′, which can hold 11 days each of about 2′·9″ x 1′-11″. Sulphur may be burnt on a little cotton in a china or any other suitable dish.

Note 2: The product obtained without sulphuring is liable to spoil rapidly during storage; this may, therefore, be all right where the dried product is not to be stored. If it has to be stored for a long period, sulphuring of the slices is necessary.

5 **Drying**: Put the treated slices for drying either in the sun or in a home-drier. In either case, care should be taken to prevent access of outside moisture to the slices. A home-drier is to be preferred since the temperature inside can be easily controlled and drying is quicker. The home-dried product is also superior to the sun-dried one. The temperature in the home-drier should be maintained at 140-145°F. Drying should be stopped when the slices become bone-dry and be broken into small bits when pressed by hand.

Note: A home-drier is a 3′ x 2′ 3′ box provided with a wooden door. The three sides and top are made of galvanized iron sheet fitted in a wooden framework, while the bottom consists of a strong iron sheet with perforations up to about 2″ from the walls all round. On both sides there are wooden runaways on which the trays are placed. The box is supported on an iron stand 1¼′ high. A kerosene oil or electric stove or charcoal oven is used as the source of heat To let off the moisture, there are two slits, each 1′-11″ x 1′-5″, with collapsible metallic flaps along the length, on both sides of the box, about 4″ below the top. The temperature and outflow of moisture are regulated by proper adjustment of these slits and the source of heat.

6. **Uses of banana chips**: The dried slices can be fried in a suitable cooking medium and served like potato chips or they can be ground into flour in any convenient type of grinding mill. Banana flour has been found suitable to replace a part of wheat flour (the proportions depending upon individual taste) in all preparations where wheat flour is used. Good quality vermicelli and cakes, can also be made out of banana flour alone.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 33

Preparation & Preservation of Cashew Apple Jam

1. **Selection of fruit**—Select fresh, fully ripe fruit of any colour.

2. **Preliminary treatement**—Wash the fruit thoroughly in running cold water, rubbing with hands (covered with rubber gloves), if necessary.

3. **Preparation of fruit**—Remove stems and leaves, if any, and immerse the fruit in 2.0 per cent common salt solution, with the help of an aluminium, enamelled or a suitable wooden disc and a weight. Remove the fruit from the salt solution after 3 days and wash it free from salt. Hold the washed fruit in a perforated crate made of aluminium or stainless steel and steam for 10-15 minutes at 10-15 lb. steam pressure, depending on the condition of the fruit. Trim off any undesirable portions, particularly the blackish portions to which the nuts were attached, with a sharp stainless steel knife, and crush the fruit with the help of a wooden ladle.

4. **Addition of sugar**—For every lb. of the fresh fruit, take one pound of pure cane sugar and a pinch of citric acid (1-1½ *masha*).

5. **Cooking**—Add sugar to the crushed fruit and cook the mixture to a temperature of 221°F (at sea level), or when the consistency of the finished product is sufficiently close to the normal consistency of fruit jams, adding citric acid towards the end of the cooking process.

Note: For every 500 ft. rise in the altitude, a decrease of 1° F should be effected in the above cooking temperature of 221° F.

6. Filling and storage—Put the boiling hot jam into clean, dry, sterilized jars or cans. Seal the cans immediately and invert them so that the lid is sterilized. On the surface of the jam in jars, pour a layer of molten paraffin wax, after allowing the jam to cool in the jars for 2–3 hours. The molten wax on the surface of the jam may be rolled along the sides so as to form a layer between the sides and the jam surface.

Note: 1. The jars may be sterilized by boiling in water for about 15 minutes. The jars for this purpose may be put in just warm water which may then be heated further to boiling.

2. To prevent breakage of glass containers at the time of pouring boiling hot product, an insulating material, *e.g.*, wooden board or dry cloth should be placed underneath.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 34

Preparation of Cashew Apple Candy

Selection of fruit—Select fresh, fully ripe and sound (free from blemish) fruit of any colour.

Preliminary treatment—Wash the fruit thoroughly in running cold water rubbing with hands (covered with rubber gloves), if necessary.

Preparation of the fruit—Immerse the washed fruit in 2.0 per cent common salt solution and raise the concentration of salt by 2.0 per cent every day so that in 5 days' time it gets to 10 per cent. When the salt concentration reaches 10 per cent, add also potassium metabisulphite at 1 oz. per 100 lb. and keep the fruit in this solution for a further period of 2-3 days. After this, wash the fruit thoroughly in water, put in a perforated crate made of aluminium or monel metal and blanch in boiling water for 5 minutes followed by steaming in a pressure cooker * for 5 minutes at 5 lb. pressure. Cool the steamed fruit by rinsing in water and give thorough pricks all round, to each individual fruit, with sharp bamboo needles.

* Equipment of this type can be had from dealers in food machinery, like Messrs. Gardners Corporation, Connaught Circus, New Delhi, Gladwyn & Co., Hornby Road, Bombay, etc.

Processing of the fruit—Prepare sugar syrup of 30° Brix by dissolving $4\frac{1}{2}$ lb. sugar in every gallon of water, add 0.1 per cent citric acid and boil for about 10 minutes. Pour the hot syrup over the fruit placed in an enamelled, aluminium, monel metal or stainless steel vessel, adding enough syrup to completely submerge the fruit. Keep the fruit immersed in the syrup by putting over it a flat cover and a weight. Cover the

container with its lid and keep it aside for 24 hours or so. Next day, drain out the syrup from the fruit, find its Brix and weigh out the sugar to be added to it to raise the Brix to 35°. Boil the drained syrup for 5-7 minutes, add the sugar, bring to a boil again and pour it back over the fruit. Repeat the heating and steeping process as above, adding enough sugar every day to raise the concentration of the drained syrup by 5° Brix till it reaches 60°; after this, repeat the process on every alternate day till the final syrup strength is 70° Brix. Leave the fruit in the final syrup, for complete absorption of sugar, for a further period of 5-6 days, determining the Brix of the syrup every day and heating it to boiling, if necessary.

Finishing process—Strain the fruit on a coarse sieve and finally dry the finished product to make a candy.

Packing and storage—Pack the dried cashew apple candy in dry screw glass jars and close air-tight. Store the filled jars in a cool, dry place.

Note: In handling this product, iron equipment should not be used as this will blacken the product.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 35

Preparation & Preservation of Cashew Apple Juice

Introduction—The cashew nut is attached to a fleshy portion called the cahsew-apple. The cashew-apple is a by-product of the cashew-nut industry in the west coast districts of Ratnagiri, North Kanara, Goa, South Kanara, Malabar and Travancore-Cochin. A conservative estimate shows that about 45,00,000 maunds of fresh cashew apple go to waste every year. The ripe apple is of bright orange or yellow colour and has a fair proportion (50-60 per cent) of juice having 12-13 per cent sugars and 0.3 per cent acidity. On account of its characteristic astringent taste and fibrous exture, the fruit has not so far found much use either as such or as a preserved product.

The following procedure is recommended for the preparation of a palatable and nutritious fruit juice.

Selection of fruit—Select fresh, fully ripe and sound fruit.

Preliminary treatment—Wash the fruit carefully in running cold water, rubbing with hands covered with rubber gloves, if possible.

Preparation of fruit—Hold the washed fruit in a perforated crate of aluminium, stainless steel or monel metal on a false bottom in a pressure cooker. Steam the fruit at 5-10 lbs. steam pressure for 5-10 minutes depending on the degree of ripeness of the fruit. Rinse the fruit and cool it in running cold water.

Extraction of juice—Extract juice from the fruit thus prepared with the help of either a worm type juice extractor or a basket press. Best results are obtained by employing the former for a preliminary extraction

and the latter for pressing the resultant residue. Then, strain the juice through a clean coarse muslin cloth.

Recipe—Add to the strained juice gelatin, at the rate of 3 grains per lb. of the juice, stir thoroughly and then set aside for 15 minutes. Strain the clear juice through a clean muslin cloth and add sugar at the rate of one oz. per lb. of the juice to obtain a sweet drink having the characteristic aroma and flavour of the cashew-apple. (*Contact with iron at any stage must be avoided as it causes discolouration of the product.*)

Bottling and preservation—Mix the sugar with the juice thoroughly and strain, if necessary. The finished product may be preserved either by heating or by using a suitable preservative. In the first case, heat the juice to a boil and immediately fill it hot, at 90-95°C, into sterilized bottles to over-flow, corking with crown corks and then heat the bottles in water at 85-90°C for 30 minutes. Allow the bottles to cool gradually to room temperature.

In the second case, add to the finished product sodium benzoate as preservative at the rate of 8.0 grains per lb. or 1 masha of the preservative to a bottle of 24-26 oz. capacity. Pour the juice into bottles which have been previously cleaned and heated in boiling water for 15-20 minutes. Cork air-tight either with crown cork seal or with clean and wetted cork stopper. Store the bottles in a cool, dry place.

Note: The preservative can be had from any chemist. It should be first dissolved in a small qnantity of water or juice and then mixed with the finished product.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 36

Preparation & Preservation of Cashew Apple Syrup

Selection of fruits—Select fresh, fully ripe and sound fruit of any colour.

Preliminary treatment—Wash the fruit carefully in running cold water, rubbing it with hands covered with rubber gloves, if possible.

Preparation of the fruit—Put the fruit in a perforated crate made of aluminium, monel metal or stainless steel and place the latter on a false bottom in a pressure cooker*. Steam the fruit at a pressure of 5–10 lb. for 5–10 minutes, depending on the degree of ripeness of the fruit. Remove the crate from the cooker and release the treated fruit in running cold water so as to wash and cool it. By this treatment the characteristic astringent taste of the fruit is removed and the fibrous texture softened.

* Equipment of this type can be had from food machinery dealers like Messrs. Gardners Corporation, Connaught Circus, New Delhi and Gladwyn & Co., Hornby Road, Bombay.

Extraction of the juice—Extract juice from the fruit thus prepared with the help of worm type juice extractor or some suitable type of basket press. Best results are obtained by employing the former for a preliminary extraction, followed by pressing the resultant residue (wrapped in a coarse cloth) in a basket press. Strain the juice through a coarse muslin cloth.

Recipe—To every lb. of the juice obtained as above, add one ounce of lime juice and a little of gelatin so that the suspended matter begins to settle down. Allow the juice to stand for 15 minutes and then strain it through a thick cloth (long cloth is quite suitable) or a 120 mesh stainless

steel or monel metal sieve. Add sugar at the rate of 2 lb. for every 3 lbs. of the extract. Dilute the resulting syrup 3-4 times its volume with plain water for use as a fresh drink. Contact with iron at any stage must he avoided as it causes discolouration of the product.

Bottling and preservation—Mix the above quantities of the ingredients thoroughly and strain through a coarse muslin cloth. Preserve by boiling the juice for a minute, filling hot at 90-95°C into sterilized bottles to over-flow, corking with crown corks immediately and then heating the bottles in water at 85-90°C for 30 minutes Allow the bottles to cool at room temperature. Alternatively, add preservative, i e., sodium benzoate at the rate of 8 grains per lb. (or 1 masha per bottle of 24-26 oz. capacity) of the finished product.

Note: The preservative which can be had from chemists or chemical suppliers should be dissolved in a small quantity of water or the finished product and then mixed with the rest of it.

Pour the finished product into bottles which have been previously cleaned and heated in boiling water for 15-20 minutes leaving 1-1½" space at the top. Cork air-tight either with a crown cork seal or by ordinary cork, slightly wetted and pushed in. Store the bottles in a cool, dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 37

Canning of Mangoes

1. **Introduction**—Although a large number of varieties of mango are grown all over India, only a few of them are suitable for canning. Among the South Indian mangoes which are commercially important, *Badam*, *Benishan*, *Neelum* and *Raspuri* give good canned products. Canned Bangalora is only of fair quality. *Rasam* varieties, which are juicy and fibrous, are not suitable for canning.

2. **Selection of fruit**—Select firm ripe fruit, free from blemish.

3. **Washing**—Wash the fruit well in running water to remove dirt and other extraneous matter.

4. **Preparation**—Peel the fruit by means of a stainless steel knife by working it round the fruit so that peel is lifted in one long strip. Slice the two sides of the fruit and cut each slice into two halves. Remove the pulp on the thin sides of the stone in two sections. Thus, from each fruit six longitudinal slices, of approximately equal size, are obtained.

5. **Filling and syruping**—Fill 8-10 oz. of the prepared material into A 2½ or butter size plain cans respectively. Pour hot sugar syrup of 50° Brix containing 0.5 per cent citric acid at a temperature of 175-180° F to prevent shrinkage of the fruit. Leave about ¼ inch head space while covering the slices with the syrup.

6. **Exhausting**—Place the filled cans in a vessel containing hot water at 185-190°F, with the top of the cans just above the surface of the water. At the end of 10 minutes, the cans become ready for closing. The process removes the air from the contents of the cans and this helps to prolong the storage life of the canned product.

7. **Sealing**—Remove the cans from the exhaust vessel, place the lid on top and close the can hermitically by means of a good can sealing machine. Small can sealers are now available in India.

8. **Cooking or processing**—Immerse the sealed cans in a vessel containing boiling water. To prevent direct heating, place a thick piece of folded cloth at the bottom of the vessel. Cook for 25 minutes keeping the water boiling all the time. This destroys any spoilage organisms inside the can.

Note: For places above the sea level, the cooking time should be increased by two minutes for every 1000 ft. rise in altitude.

9. **Cooling and storage**—Remove the cans from the sterilization vessel and cool them quickly in running water to slightly above the room temperature. This prevents over-cooking and also helps in drying the outside of the cans. The canned product keeps well for more than $1\frac{1}{2}$ years.

10. **Uses**—The canned mangoes are served as such or with other fresh or canned fruits and cream in-fruit salads.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 38

Canning of Jack Fruit

1. **Introduction**—Jack fruit (*Artocarpus integrifolia*) is available in plenty, during seasons, in Bengal, Bihar, Madras and Mysore. There are several varieties, some having crisp and others fibrous and leathery bulbs. The colour of the bulbs varies from light yellow to orange. The fruit has a strong flavour. Experiments conducted at the Central Food Technological Research Institute. Mysore, have shown that the bulbs give a good canned product.

2. **Selection of fruit**–Select ripe fruit which has crisp and yellow bulbs having good flavour.

3. **Preparation of the fruit**—Cut the fruit into eight or sixteen pieces first across and then lengthwise. Remove the pithy and gummy core by means of a sharp knife to free the bulbs. Smear a little cooking oil on the hand to prevent stickiness. Separate the bulbs from the rind and the surrounding carpels. Trim off the top and bottom of the bulbs and remove the seed inside along with its thin covering. Cut the bulbs into halves, quarters or smaller slices.

4. **Preparation of syrup**–Prepare 50° Brix syrup of 0.5 per cent acidity by dissolving sugar in an equal weight of water and adding 8 ozs. of citric acid per 100 lbs. of the syrup. Filter the syrup.

5. **Filling and syruping**—Fill 20 to 18 ozs. of the prepared fruit into plain A $2\frac{1}{2}$ or butter size cans and pour hot syrup (175–190°F) over the fruit leaving about $\frac{1}{4}$ inch head space.

6. **Exhausting**—Place the filled cans, with the lid loosely placed on the top, in a vessel containing hot water at 180°-190°F with the top of the

cans about an inch above the surface of the water. At the end of 10 minutes the cans are ready for closing.

7. **Sealing**—Remove the cans from the exhaust vessel and seal them immediately by means of a can sealer. Burpee or Dixie or any other type of can sealer which is available in India is suitable for the purpose.

8. **Cooking or processing**—Immerse the sealed cans in a vessel containing boiling water. To prevent direct heating, place a thick piece of folded cloth at the bottom of the vessel. Cook for 30 minutes by keeping the water boiling all the while.

Note: For places above the sea level, the cooking time should be increased by two minutes for each 1000 ft. rise in altitude.

9. **Cooling and storage**—Remove the cans from the pan and place them under running water to cool them quickly to a little above the room temperature. This helps to prevent over-cooking of the fruit and rusting of the cans during storage by quick drying of the outside of the cans. Store the cans in a cool dry place. The product will keep well for about 1½ years if all the processes have been done carefully.

10. **Uses**—The canned jack fruit can be served as such or with other fruits like mango, banana, pineapple, etc., fresh or canned, to give delightful fruit salads.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 39

Preparation & Preservation of Jack Fruit Nectar

1. **Introduction**—Jack fruit (*Artocarpus integrifolia, L.*) is available in plenty in Begal, Bhihar, Madras and Mysore. There are several varieties, some having crisp and others fibrous or leathery bulbs. The colour of the bulbs varies from light yellow to orange. The ripe fruit has a strong characteristic flavour of its own. The bulbs may be consumed fresh or made into various fruit products. The method of preparation of Jack Fruit Nectar is as follows :

2. **Selection of the fruit**—Select ripe fruit having succulent bulbs.

3. **Preparation of the fruit**—Cut the fruit across into two halves and then each half lengthwise into four or eight pieces depending upon the size of the fruit. Remove the pithy and gummy core with a sharp knife to free the bulbs. Smear a little cooking oil on the hands to prevent stickiness and separate the bulbs from the rind and the surrounding carpels. Trim the top and bottom of the bulbs and remove the seed inside along with its thin covering. Cut each bulb longitudinally into 4 or 8 pieces as desired.

4. **Preparation of fruit pulp and sugar syrup**—(a) *Fruit Pulp*: Soften the cut pieces of the bulbs by heating them slowly in about half their weight of water and stirring with a wooden ladle. Mash the softened pieces into a fine pulp by crushing them thoroughly. Rub the pulp through a fine sieve to remove any large pieces. (b) *Sugar Syrup*: Prepare sugar of 60° Brix by dissolving 3 lb. of sugar in 2 lb. of water and heating Remove the scum, if any, and filter the syrup.

cans about an inch above the surface of the water. At the end of 10 minutes the cans are ready for closing.

7. **Sealing**—Remove the cans from the exhaust vessel and seal them immediately by means of a can sealer. Burpee or Dixie or any other type of can sealer which is available in India is suitable for the purpose.

8. **Cooking or processing**—Immerse the sealed cans in a vessel containing boiling water. To prevent direct heating, place a thick piece of folded cloth at the bottom of the vessel. Cook for 30 minutes by keeping the water boiling all the while.

Note: For places above the sea level, the cooking time should be increased by two minutes for each 1000 ft. rise in altitude.

9. **Cooling and storage**—Remove the cans from the pan and place them under running water to cool them quickly to a little above the room temperature. This helps to prevent over-cooking of the fruit and rusting of the cans during storage by quick drying of the outside of the cans. Store the cans in a cool dry place. The product will keep well for about 1½ years if all the processes have been done carefully.

10. **Uses**—The canned jack fruit can be served as such or with other fruits like mango, banana, pineapple, etc., fresh or canned, to give delightful fruit salads.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 39

Preparation & Preservation of Jack Fruit Nectar

1. **Introduction**—Jack fruit (*Artocarpus integrifolia, L.*) is available in plenty in Begal, Bhihar, Madras and Mysore. There are several varieties, some having crisp and others fibrous or leathery bulbs. The colour of the bulbs varies from light yellow to orange. The ripe fruit has a strong characteristic flavour of its own. The bulbs may be consumed fresh or made into various fruit products. The method of preparation of Jack Fruit Nectar is as follows:

2. **Selection of the fruit**—Select ripe fruit having succulent bulbs.

3. **Preparation of the fruit**—Cut the fruit across into two halves and then each half lengthwise into four or eight pieces depending upon the size of the fruit. Remove the pithy and gummy core with a sharp knife to free the bulbs. Smear a little cooking oil on the hands to prevent stickiness and separate the bulbs from the rind and the surrounding carpels. Trim the top and bottom of the bulbs and remove the seed inside along with its thin covering. Cut each bulb longitudinally into 4 or 8 pieces as desired.

4. **Preparation of fruit pulp and sugar syrup**—(a) *Fruit Pulp*: Soften the cut pieces of the bulbs by heating them slowly in about half their weight of water and stirring with a wooden ladle. Mash the softened pieces into a fine pulp by crushing them thoroughly. Rub the pulp through a fine sieve to remove any large pieces. (b) *Sugar Syrup*: Prepare sugar of 60° Brix by dissolving 3 lb. of sugar in 2 lb. of water and heating Remove the scum, if any, and filter the syrup.

5. **Preparation of Nectar**—Blend the various ingredients according to the following recipe.

Pulp	....	10 lb.
Sugar	....	22½ lb.
Water	....	15 lb.
Citric acid	...	7½ lb.

Strain the finished product through a muslin cloth.

6. **Preservative**—To preserve the product for use over a long period, add potassium metabisulphite at the rate of 1 ounce per hundred pounds of the prepared nectar. For the recipe given, half an ounce of the preservative will be sufficient. It should be dissolved in a small quantity of water and then the solution mixed well with the product.

7. **Bottling and storage**—Fill the nectar in 12 oz. or 24 oz. dry bottles which have been previously cleaned and sterilized by heating in boiling water for 15-20 minutes. Leave head-space of about 2″ in the bottle. Close the bottles air-tight with crown corks or with ordinary corks. In the case of ordinary corks, dip the mouth of the corked bottle in molten paraffin wax to give a good seal. Keep the bottles in a cool dry place.

8. **Use**—Jack nectar is a palatable beverage with pleasant taste and aroma and keeps well. Before use, dilute it with 4-5 volumes of water. It may be taken as such or after carbonation.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 40

Preparation of Jack Fruit Jelly

1. **Introduction**—Jack fruit contains 70-75 per cent of the waste material comprising the outer spiny rind and the inner perigones (undeveloped bulbs, etc.) This waste material has been found to contain about 2 per cent of high quality pectin, and a clear light yellow jelly with good taste and aroma can be prepared from it.

2. **Selection of material**—Select sound, fully ripe fruit.

3. **Preliminary treatment**—Wash the fruit thoroughly in running water to remove dirt and other extraneous matter.

4. **Preparation of material**—With a sharp stainless steel knife, cut the fruit into small pieces. Remove the bulbs for use as fresh fruit or for use after suitably preserving it (smearing the hands with a little edible oil facilitates handling the inner parts of the fruit), leaving the outer spiny rind, the inner fluffy portion, the trimmings from the bulbs etc., for extraction of pectin and rejecting the central cores etc.

5. **Extraction of pectin**—Boil the prepared material with an equal weight of water and 0.3 per cent of citric acid for 30 minutes and drain off the extract. Reboil the residue with half the quantity of water for 15 minutes and drain again. Mix the two extracts and set aside for settling. Syphon off the clear extract to prepare the jelly.

6. **Testing of pectin**—The extract may be tested for pectin with methylated spirit as follows. Add two teaspoonful of methylated spirit to one teaspoonful of the clear extract. The formation of one big clot indicates high pectin content, smaller clots indicate medium pectin content, whereas

a thin gelatinous mass shows poor pectin content. An extract of poor pectin content should first be concentrated to give a test for good pectin content before the preparation of jelly.

7. **Addition of sugar and acid**—Add sugar and citric acid at the rate of 1 lb. of sugar and 2.7-3.6 g. of citric acid per lb. of the clear extract.

8. **Cooking**—Cook the mixture till the mass boils at 222°F at sea-level or till it gives a sheeting test, i.e., when it is held in the spoon, it starts dropping in the form of flakes and not in drops.

Note: For every 500 ft. rise in altitude, the boiling point of water falls by 1° F and a corresponding decrease may be effected in the cooking temperature.

9. **Packing and storage**—Pour the finished product into clear and sterilized glass jars keeping a wooden board below. (This prevents breaking of glass containers when the hot product is poured into them). Allow the product to cool, and then, seal the jars air-tight.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 41

Preparation of Jack Pickle

1. **Selection of material**—Take small, tender and green jack fruit of which both the seeds and the pithy portion have not become hard. Wash it free of dirt.

2. **Preparation of material**—Trim the stalk end of the fruit and peel the thick outer prickly rind by means of a sharp knife. (Smear a little cooking oil on the hand to prevent stickiness while handling the fruit). Cut the peeled fruit into thin slices $\frac{1}{2}''$-$\frac{3}{4}''$ thick.

3. **Curing**—Put these slices into a clean, glazed stone jar filling the interspace with salt solution of about 8 per cent strength. Keep the pieces immersed in the brine solution by placing a wooden weight on top of them. On the following day, add more common salt so as to raise the strength of the brine to about 10 per cent. Repeat this process daily till the concentration of salt in brine reaches about 15 per cent. Keep the pieces in this strong brine for 8–10 days to ensure complete curing. During this process, the slices become fairly soft and clean.

4. **Pickling**—The cured slices, after being washed in water, form the base for the preparation of a variety of pickles, of which sweet oil pickle and spiced vinegar pickle are important. This preliminary salt curing is essential particularly for vineger pickle, plain or spiced where the pieces have to maintain an attractive appearance in a clear, vinegar medium.

5. **Sweet oil pickle**—Use the ingredients according to the following recipe:

i.	Brined slices	.... 20 lb.
ii.	Salt	.... 1 lb. 4 oz.
iii.	Chilli powder	.... 6 oz.
iv.	*Zeera*	.... 1 oz.
v.	Clove	.... 1 oz.
vi.	Cardamom	.... ½ oz.
vii.	Cinnamon	.... 1 oz.
viii.	Ginger, dried	.... ½ oz.
ix.	Onion – chopped	.... 10 oz.
x.	Mustard seed	.... 1 oz.
xi.	Gingelly oil	.... 2 lb. 8 oz.
xii.	Garlic	.... 1 oz.
xiii.	Vinegar	.... 2 lb. 8 oz.
xiv.	Sugar	.... 2 lb. 8 oz.
xv.	Oil (sufficient to cover the pickle in the container).	

Fry chopped ginger, onion, garlic and mustard seeds in a little oil until they turn brown. Add this and the rest of the spices to the jack pieces, put in a glazed jar, mix well and place the jar in the sun for 3-4 days, with occasional stirring. Cover the mouth of the jar with muslin cloth to prevent the flies from reaching the pickle. Add sugar and vinegar, mix well and keep the jar again in the sun for another 3-4 days when the pickle will be ready. Fill it into glass or glazed earthern-ware jars and pour oil sufficient to cover the pickle well. This helps in improving the keeping quality of the pickle.

6. **Spiced vinegar pickle**—Prepare the spiced vinegar according to the recipe given below:

Sugar	.... 3 lb.
8 per cent vinegar	.... 4 lb.
Water	.... 1½ lb.
Clove, headless	.... } 1 g. each.
Cinnamon whole	.... }
Coriander seed	.... }
Ginger root, ground	.... }
Mace, broken	.... }
Mustard seed, broked	.... }

Tie the spices loosely in a muslin bag, and place the bag in a vessel containing the vinegar, water and sugar. Cook gently over a low fire for 3-4 hours to get the spice extract with 50° Brix and not less than 3 per cent acidity. If desired more spices may be used according to taste. Allow the vinegar extract to cool gradually and remove the cloth bag. Use equal quantities of the salt-cured stock and the spiced vinegar.

7. **Plain vinegar pickle**—In this case, use plain 8 per cent vinegar only, without the addition of any sugar or spices. It is, however, necessary to replace the first vinegar with fresh 8 per cent vinegar, as the vinegar first added becomes diluted. The pieces look very attractive in the vinegar solution.

8. **Packing and storage**—Pack the pickle into condiment jars, preferably with non-metallic lids. Store the jars in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 42

Preparation of Ginger Preserve & Candy

1. **Introduction**—Ginger is the underground stem or rhizome of the perennial plant *Zingiber officinale.* It is widely used as a flavouring material in confectionery, ginger beer, chutneys and other culinary preparations. The Jamaican variety of ginger yields the finest flavoured beverages. The preserved or candied ginger has a sharp sweet taste. The Canton variety, extensively grown in Canton, China, is juicy and succulent with a rich flavour and gives the best preserves and candy. The Indian variety is comparatively hard and knotted. The method of preparation of ginger preserve (which can be converted into candy, as and when required) is given below:

2. **Selection of raw material**—Select tender, fibreless and large sized rootlets or fingers 3-4 months old. Ginger grown on sandy loam gives a very good product.

3. **Preliminary washing**—Wash the ginger thoroughly to remove all traces of dirt and adhering matter.

4. **Preparation of the material**—Scrape off the skin of the ginger with a sharp stainless steel knife and cut it into pieces of the desired shape and size.

5. **Softening ginger**-Soften the ginger by (i) boiling it in 0.5 per cent solution of citric acid (quantity of the solution being sufficient to cover the ginger) in a covered aluminium, stainless steel or heavily tinned brass or copper vessel for a period of six hours or (ii) cooking in 0.5 per cent solution of citric acid at 10 lb. steam pressure in an autoclave for one hour. Citric acid is used to bleach or whiten the colour during softening.

6. **Pricking of pieces**—Remove the ginger and wash it well with cold water. When sufficiently cooled, prick the softened pieces with stainless steel, or wooden prickes. Wash again. The ginger pieces are now ready for impregnation with sugar syrup.

7. **Preparation of syrup**—Prepare 30° Brix syrup by dissolving 3 parts of sugar in 7 parts of water. Boil and filter the syrup through a thick muslin cloth. (Use about 1 lb. of syrup for 1 lb. of the prepared ginger).

8. **Impregnation of ginger with sugar syrup**—Boil the prepared ginger in the 30° Brix syrup for 15 minutes and allow it to stand overnight, ginger being completely covered by the syrup. After about 24 hours, drain off the syrup and increase its concentration to about 35° Brix by adding more sugar and heating if necessary. Boil the ginger with the syrup for 15-20 minutes and keep it again overnight taking care to have the ginger always covered by the syrup. Repeat this every day, till the concentration of the syrup is about 60° Brix. At this stage, add a small quantity (about 0.1 per cent of the total weight of the syrup) of citric acid or tartaric acid or 5 per cent by weight of invert sugar or corn syrup. Carryout the process of absorption through increase in the strength of the syr up by 5° Brix each day, till it reaches 75° Brix. The preserve is then ready to be packed.

9. **Candying**—Set aside the prepared preserve for 2-3 months for thorough penetration of sugar into the ginger. Then boil it for about 5 minutes. While still hot, drain off the syrup and roll the pieces in finely-ground sugar. Place the pieces on a wooden tray and dry them in shade or at 120° F in a drier till they are no longer sticky.

10. **Packing and stortge**—The finished products are packed in air-tight glass jars previously sterilized and carefully dried. If desired, the individual pieces of the candy may be wrapped in cellophane paper. Store the jars in a cool dry place.

11. **Utilization of residual syrup**—The syrup left over after candying can be used again for preparing more ginger preserve or used as a ginger syrup for flavouring aerated waters.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 43

Preparation & Preservation of Pineapple Juice

1. **Introduction**—Pineapple juice is a delicious beverage and is usually prepared as a by product in the canning industry. Scrapings and cores are used for juice extraction. Whole fruits may also be used.

2. **Selection of fruit**—Select fully developed ripe fruits with the characteristic rich aroma. Fruits of low grade variety or cull fruits of a superior veriety can also be used.

3. **Preliminary treatment**--Remove the crown by a sharp twist with the hand and peel the fruit with a large-size, sharp, stainless steel knife. Remove the eyes as far as possible with a sharp V-shaped stainless steel knife and discrad the damaged portions if any.

4. **Preparation of fruit**—Cut the fruit into small pieces and pass through a mincer or chop them finely with a sharp stainless steel knife.

5. **Extraction of juice**—(a) Wrap the prepared fruit in a thick cloth and press out the juice in a small basket-type hand press or (b) use a worm type juice extractor to express the juice. Strain the juice through a coarse, muslin cloth.

6. **Sweetening of juice**—The juice obtained is generally tart and becomes more palatable when sweetened Add sugar according to state (adout 1 oz. per lb.) and strain the juice again through a coarse muslin cloth.

7. **Preservation of juice**—Heat the prepared juice rapidly in an aluminium or stainless steel pan on direct fire to a temperature of 180-185°F. Pour the hot juice into plain cans leaving ¼" head-space and

seal the can immediately. Alternatively pour the juice into previously sterilized warm bottles to overflowing and seal air-tight with crown corks.

8. **Processing**—Process the cans (milk-size) in boiling water and the bottles in water at 175-180°F for 25 minutes at sea level.* The juice may also be preserved with potassium metabisulphite which is added at the rate of 1 oz. for every 100 lb. of the finished product.

*At higher altitudes the processing time should be increased by 2 minutesfor every 1000 ft. rise in altitude.

9. **Cooling and storage**—Cool the cans immediately in running water and allow the bottles to cool gradually. Store the cooled products in a cool and dry place.

10. **Use**—Pineapple juice is taken as a cool drink either as such or preferably with plain soda.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 44

Canning of Pineapple

1. **Introduction:** Pineapple is a tropical fruit and is cultivated in India chiefly on the West coast, Assam and West Bengal. On account of its pronounced flovour, the fruit lends itself to the preparation of a good canned product, the method of which is described below:

2. **Selection of fruit:** Select ripe fruit which has developed a characteristic reddish brown colour on its peel.

3. **Preparation of the fruit:** Remove the head of the fruit which is spread out into a number of spines by a sharp twist with hand. Cut the fruit transversely into ½" thick slices using a big sharp stainless steel knife. Remove the outer fibrous coating with a specially designed borer type sharp dissector and the central hard core with a similar type small size borer. Trim off the eyes, if any, left in the disc, with a V-shaped stainless steel knife, thus getting rings of uniform size.

4. **Filling and syruping:** Place the prepared pine-apple rings (5-6) in a butter size plain can and fill the inter-space with boiling sugar syrup, prepared by mixing one cup of sugar with one cup of water, leaving about ½" headspace.

5. **Exhausting and sealing:** Place the filled cans with lids loosely on, in a large pan containing boiling water in such a way that the water level outside is about 2" below the tops of the cans. Cover the pan and heat for about 10 minutes (when the centre of the can records a temperature of 160°-170°F). Seal the cans with a can sealer.

6. **Pasteurization and cooling:** Put the sealed cans in boiling water kettle with its bottom covered with a thick cloth or by a wooden frame,

and continue boiling for about 15 minutes. Remove the cans quickly and leave them in running cold water.

7. **Storage:** Take out the cans while still warm and leave in the open air after wiping them dry. This facilitates quick drying of the wet surface of the cans, thereby avoiding rusting. Store in a cool, dry place.

8. **Use:** The canned fruit along with the syrup may be used as a sweet dish either alone or with cream and fruit salad.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 45

Preparation & Preservation of Pineapple Jam

1. Introduction—One of the by-products which can be successfully made in the pineapple canning factories is the jam from the fruit. The product like any other jam is finding increased use with the change in our dietary habits and therefore is important as a home-and cottage scale preparation.

2. Selection of raw material—Any trimmings or residual pieces of the pulps obtained during the canning of pineapple may be used for the purpose. For preparing the jam from the whole fruit, select ripe juicy fruit with its characteristic aroma. If the fruit is not quite ripe, allow it to stand, for a day or two, so that it may develop sweetness, aroma etc.

3. Preliminary treatment—After washing the fruit thoroughy in running water, remove the crown with a sharp twist wtih the hand and peel off the coarser outer skin wtih a sharp stainless steel knife. Trim off the bruised and blemished portions, if any, and remove the eyes with a V-shaped stainless steel knife. Cut the sound portions of the remaining fruit into small-size pieces and crush them thoroughly to obtain a uniformly mashed mass.

4. Addition of sugar–Pineapple fruit being generally acidic in nature, add an equal quantity of sugar by weight to the prepared fruit and allow it to stand for ½-1 hour so that the sugar is absorbed properly.

5. Cooking—Cook the mixture on a medium fire in the beginning with occasional stirring and crushing till the cooked mass is sufficiently thick or the temperature at sea level reaches 222°F.

Note: For every 500 ft., rise in the altitude, a decrease of 1°F in the cooking temperature of 222°F should be effected.

6. Filling—Put the boiling hot jam into sterilized jars (screw type) or cans and cap or seal immediately. Invert the containers for about 5 minutes so as to sterilize their lids.

Note. To prevent breakage of glass containers at the time of pouring of the boiling hot product an insulating material (e. g., wooden board or a dry cloth) shauld be placed underneath.

7. Cooling and storage—Allow the product to cool and then store in a cool dry place.

8. Use—This jam, like that from any other fruit, can be kept for a considerable length of time and used as a spread for bread slices, etc.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 46

Canning of Sapota Segments

1. **Introduction**—Sapota (*Achras sapota* syn. *Sapota achras*) is one of the most adaptable of the tropical fruits and has been round to thrive under a diversity of soil and climatic conditions up to an altitude of 4,000 ft. above the sea level. The fruit is known by several names in different parts of the world such as sapodilla, *chiku*, *dilly*, naseberry, etc. This fruit is among the most popular fruits and is grown in the coastal regions and in South India, mainly for dessert purposes.

2. **Selection of fruit**—Select ripe fruit which gives a characteristic sweet flavour and aroma and is just soft to touch (the turning stage of the fruit from unripe to ripe).

3. **Preparation of the fruit**—Wash the fruit thoroughly in running cold water. Remove the rather tough peel of the fruit with the help of sharp and pointed stainless steel knives. Break the peeled fruit into natural segments removing the seed and other fibrous threads from inside.

4. **Filling and syruping**—Place the prepared segments of the fruit in a plain buttersize or A 2½ size can using about 10 oz., or 18-20 oz., of the fruit respectively. Prepare sugar syrup of 55°B (by mixing 5 cups of sugar with 4 cups of water and 2 oz., of citric acid) and heat to boiling. Fill the interspace of the filled can with boiling sugar syrup leaving about ½″ headspace.

5. **Exhausting and sealing**—Place the filled cans with lids loosely on, in a large pan containing boiling water, in such a way that the water level outside the cans is about 2″ below their tops. Cover the pan with its lid and heat for about 10 minutes when the centre of the can records

a temperature of 160-165°F. Seal the cans immediately by a double seam can-sealer.

6. **Pasteurization and cooling**—Put the sealed cans in boiling water kettle with its bottom covered with a thick cloth or by a wooden frame and continue boiling for about 20 minutes in the case of butter size cans and for 25 minutes in the case of A 2½ size cans. Remove the cans quickly and leave them in running cold water.

7. **Storage**—Take out the cans while still warm and leave in the open air after wiping them dry. This facilitates quick drying of the wet surface of the cans thereby avoiding rusting during storage. Store in a cool dry place.

8. **Use**—Canned sapota is a delicious product wherein the fruit retains its characteristic flavour.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 47

Preparation & Preservation of Sapota Squash

1. **Introduction**—Sapota (*Achras sapota* syn. *Sapota achras*) is one of the most adaptable of the tropical fruits and has been found to thrive under a diversity of soil and climatic conditions upto an altitude of 4,000 ft. above the sea-level. The fruit is known by several names in different parts of the world such as sapodilla, *chiku*, *dilly*, naseberry, etc. This fruit is among the most popular fruits and is grown in the coastal regions and in South India mainly for desert purposes.

2. **Selection of the fruit**—Select fully ripe fruit with its characteristic sweet and pleasant flavour and aroma and which is just soft to the touch (the transitional stage of the unripe fruit changing to the ripe one).

3. **Preliminary treatment**—Wash the fruit thoroughly in running water to remove dust and other extraneous matter.

4. **Preparation of the fruit**—With a sharp and pointed stainless steel knife, remove the outer thin skin (in the case of properly developed and ripe fruit this operation is simple as the skin can be stretched from one end to the other longitudinally). Break the peeled fruit into segments and remove the hard black seeds and other fibrous threads from inside.

5. **Extraction of the juice**—To facilitate easy extraction of the juice, pass the peeled fruit through a meat mincer and make it into a uniform pulp before extracting the juice. Wrap the pulp in a thick cloth and press out the juice either with gloved hands or in a small basket type hand worked press.

6. **Recipe**—Mix the ingredients in the following proportions:

Pulp	10 lb.
Sugar	10 lb.
Water	10 lb.
Citric acid	6.7 oz.

Beat the mixture thoroughly to a uniform syrupy mass and then strain it through a coarse muslin cloth.

7. **Preservation of the product**—Preserve the product by the addition of potassium metabisulphite at the rate of 5 grains per lb., of the product or by sodium benzoate at the rate of 8 grains per lb., or by pasteurization at 180-185°F for 30 minutes (12 oz. bottles). If the product is packed in cans, processing at 175-180°F for 25 minutes should be done for safe preservation.

Note: For every 1000 ft. rise in the altitude of the place the processing time should be increased by 2 minutes.

8. **Cooling and storage**—In the case of pasteurized squash in cans, the product should be cooled in running cold water, and in the case of squash preserved in bottles with preservatives, the product may be stored in a cool dry place. Storage trials have shown that the product could be kept in its normal condition for more than 6 months.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 48

Preparation & Preservation of Sapota Jam

1 **Introduction**—Sapota (*Achras sapota* syn· *Sapota achras*) is one of the most adaptable of the tropical fruits and has been found to thrive under a diversity of soil and climatic conditions upto an altitude of 4,000 ft. above the sea level The fruit is known by several names in different parts of the world such as sapodilla, *chiku*, *dilly*, naseberry, etc. It is a very popular fruit and is grown in the coastal regions and in South India mainly for dessert purposes.

2· **Selection of the fruit**—Select ripe fruit with its characteristic sweet and pleasant flavour and aroma and which is just firm to touch (the transitional stage of the unripe fruit changing to the ripe one).

Preliminary treatment--Wash the fruit thoroughly in running water to remove the dust and other extraneous matter.

3· **Preparation of the fruit**—With a sharp and pointed stainless steel knife, remove the outer thin skin (in the case of properly developed and ripe fruit this operation is simple as the skin can be stretched from one end to the other longitudinally)· Break peeled fruit into segments and remove the hard black seeds and other fibrous threads from inside.

The following recipe has been worked out for this product.

Recipe:	Pulp	4 lb.	Water	½ lb.
	Sugar	3 lb.	Citric Acid	2 oz.

Maxing and cooking—Mix the above ingredients thoroughly and leave it for about half an hour to enable the fruit segments to absorb

sugar. Cook the mixture, at first on a medium fire, and stir occasionally. Crush the cooked mass sufficiently till the temperature at the sea level reaches 222°F.

Note: For every 500 ft. rise in the altitude, a decrease of 1°F in the cooking temperature of 222°F should be effected.

If the fruit after cooking does not give a well set jam, which generally happens in the case of fully ripe fruit, small amounts of powdered pectin should be added to give a good product.

6. **Filling**—Put the boiling hot jam into sterilized jars (screw type) or cans and cap or seal immediately. Invert the containers for about 5 minutes so as to sterilize their lids.

Note To prevent breaking of glass containers at the time of pouring boiling hot product, an insulating material e. g., wooden board or a dry cloth should be placed underneath.

7. **Colling and storge**—Allow the product to cool and then store in a cool dry place.

8. **Use**—This jam, like that from any other fruit can be kept for a considerable length of time and is used as a spread for bread slices, etc.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 49

Preparation & Preservation of Loquat Jam

1. **Introduction**—The Loquat plant is grown for its ornamental value in different parts of the country upto an altitude of about 6,000 ft. There are several varieties, two of them which are more popular have the white and the yellow flesh. The former is more acidic and poor flavoured than the latter. The fruit is used for table purposes.

2. **Selection of the raw material**–Select fresh, fully ripe whole fruit with sweet taste and characteristic aroma and if not fully ripe, keep it till it is so. Slightly damaged fruit may be trimmed and used.

3. **Preliminary treatment**—The fruit is thoroughly washed in running water and the thin coat, removed by a sharp stainless steel knife, is rejected. The fruit is deseeded and cut into small pieces which are mashed thoroughly to obtain a uniform mass.

4. **Addition of sugar**—Depending upon the variety of Loquat used (slightly acidic or sweet), add sugar in equal quantity or $\frac{3}{4}$ of the weight of the fruit. Mix the mass well and allow it to stand for some time (say 30-40 minutes).

5. **Cooking**–Cook the mass on a medium fire to begin with and with occasional stirring and crushing followed by quick heating to get a sufficiently thick preparation which corresponds to a temperature of 222°F at sea level.

Note: For every 500 ft. rise in the altitude, a decrease of 1°F in the cooking temperature of 222°F should be effected.

6. **Filling**—Put the hot jam (almost boiling) into sterilized screw-type jars or cans and accordingly cap or seal immediately. Invert the containers used for about 5 minutes so as to sterilize the lid.

Note; To prevent the breakage of glass containers at the time of pouring hot product, an insulating material e. g, wooden board or a dry cloth, should be placed underneath the container.

7. **Cooling and storage**—Allow the product to cool and then store in a cool dry place.

8. **Use**—This jam, like that from any other fruit, can be kept for a cansiderable length of time and used as a spread for bread slices, etc.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 50

Preparation & Preservation of Loquat Jelly

1. **Introduction**:—The Loquat plant grows indifferent parts of the country upto an altitude of about 6,000 ft., and is generally put up for ornamental purposes. Of the several varieties, two which are more common are the white and the yellow flesh varieties, the former being more acidic and poor flavoured than the latter which is invariably used for food preparations.

2 **Selection of the raw material**—Select fully ripe whole fruit which has developed its characteristic aroma and sweet taste. If the fruit is not ripe, keep it at the room temperature till it becomes ripe. Slightly damaged fruit may also be used after proper trimming and rejecting the damaged portions.

3. **Preliminary treatment**—The fruit is thoroughly washed and the thin coat carefully removed with the help of sharp stainless steel knives. The fruit is deseeded and cut into small pieces.

4. **Extaraction of Pectin**—Add water just enough to cover the cut fruit. Add citric acid in small quantities (at the rate of 10-15 g per lb. of the fruit). Boil the mass for about half an hour or even more, occasionally crushing with a wooden ladle till the extract shows good stickiness. Filter through a coarse cloth and allow the extract to settle.

5 **Testing of Pectin**—To a spoonful of the clear extract in a test tube, add 2 spoonfuls of spirit. The formation of one big clot indicates that the extract is rich in pectin whereas silghtly smaller clots indicate that the pectin of the extract is poor. In such a case, boil the extract so that it is concentrated and gives a test for rich pectin.

6. **Addition of sugar**:—To every cup of the clear extract obtained after decantation, add $\frac{3}{4}$-$\frac{1}{2}$ cup of sugar depending upon whether the final extract is rich or medium in pectin.

7 **Cooking**—Cook the mixture on a strong fire till the final preparation attains a temperature of 222°F at sea level.

Note: For every 500 ft. rise in the altitude, a decrease of 1°F in the cooking temperature of 222°F should be effectd.

8. **Filling**:—Put the hot jelly (just after it is removed from the fire) into sterilized screw-type jars or tin cans and accodingly cap or seal immediately. Invert the containers used for about 5 minutes so as to sterilize their lids.

Note: To prevent the breakage of glass containers at the time of pouring the hot product, an insulating material e. g., wooden board or a dry cloth should be placed underneath the container.

9. **Cooling and storage**—Allow the product to cool and store in a cool dry place.

10 **Uses**—Like jelly from any other fruit, this product can be kept for a considerable length of time and is used as a spread for bread slices.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No 51

Preparation of Canned Loquats

1. **Introduction**—The Loquat plant is grown for its ornamental value in different parts of the country upto an altitude of about 6,000 ft. There are several varieties, two of them which are more popular have the white and the yellow flesh. The former is more acidic and poorer in flavour than the latter. The fruit is used for table purposes and also made into various preserved products. Method for preparing canned loquats is given below :

2. **Selection of the fruit**—Select fresh, whole, fully developed and sound fruit of yellow variety which has a pronounced flavour, sweet taste and an attractive appearance.

3. **Preliminary treatment**—Wash the fruit thoroughly and remove the thin coat carefully with the help of sharp stainless steel knives. Deseed the fruit and cut into halves.

4. **Filling and syruping**–Use plaincans or screwtype glass jars whichhave rubber ring to give an air-tight sealing. Dip the cans or the jars in boiling water before use. Fill the container with two-thirds its capacity by wt. of the prepared fruit. Pour boiling hot syrup (prepared by mixing 2 cups of sugar with 3 cups of water and a pinch of citric acid) leaving about ½″ space on the top of the container.

5. **Exhausting**–Put the filled cans or bottles in a large kettle containing water with its level 2″ below the tops of the container. Cover the kettle and bring the water to boil till the centre of the can or the jar records a temperature of 160-170° F which is generally accomplished in about 10-12 minutes.

6. **Sealing**—Remove the cans or the jars individually from the hot water. Replace any portion of the liquid contents of the can or the jar by adding boiling hot syrup. Place a clean lid on the filled can and seal with the help of a home can sealer (available with the Metal Box Co. of India, Calcutta) and seal the screw cap jars tightly.

7. **Pasteurization**—Put the sealed containers in a large pan containing boiling water and having at its bottom a thick clean cloth (this avoids breakage of glass jars and the bumping of the containers during the subsequent boiling). Keep the level of the water an inch or two above the tops of the containers. Continue heating for 25-30 minutes.

8. **Cooling**—Remove the cans quickly from the pasteurising kettle and leave them underrunning cold water to effect quick cooling. Remove them when slightly warm and wipe them dry. In the case of glass jars, remove the packed container individually taking care not to expose the hot jars to cool surfaces particularly cold water and air draught which would break the jars.Allow them to cool slowly.

9. **Storage**—After the finished products have cooled, stock the containers properly in a cool dry place.

10. **Uses**—The canned fruit is used with other fresh or canned fruits or milk cream as a sweet dish.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 52

Dehydration of Ripe Bananas

1. **Selection of raw material**-Select firm, ripe fruits free from blemishes and bruises of any kind.

2. **Preliminary treatment**—Wash the fruit thoroughly to get rid of extraneous matter.

3. **Preparation of the fruit**-Peel the fruit suitably to remove all the inedible matter adhering to the skin. Halve the fruit length-wise or cut into slices cross-wise. Immerse the cut fruit for about 15 minutes in 1% solution of sodium carbonate and fill it up by carefully rinsing the fruit in clean fresh water.

4. **Loading**—Spread the fruit on woodenflat bottom trays with the cut surfaces upwards.

5. **Sulphuring of the fruit**— Keep these trays in a fumigation chamber (sulphur box) wherein the cut fruit is exposed to the fumes of SO_2 obtained by burning sulphur at the rate of 8 lbs. per ton of the fruit for every 1000 c.ft. of the chamber volume. According to the experience gained in this direction, half an hour's exposure yields a final dried product with about 500 p.p.m. of SO_2 which keeps the product alright during storage.

6. **Dehydration** - Remove these trays and put them in the drier (home type) avoiding the contact of the fruit with iron as far as possible. Maintain a temperature of of 130-140°F when it will take about 15-20 hours to get a final product having a moisture content of 18-22%.

7. **Packing and Storage**—Pack the finished product in moisture proof paper and keep in friction top tins thereby avoiding direct access of moisture to the finished product.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 53

Canning of Ripe Banana

Banana is a tropical fruit available in plenty during its season in different States such as Bombay, Madras, Bengal, Mysore. There are several varieties which vary both in size, taste and aroma. The poorer varieties are used mostly for cooking purposes but the superior ones are ripened and used as table fruit.

1. **Selection of fruit**—Select fully ripe but firm fruit with characteristic aroma.

2. **Preparation of the fruit**—Peel the ripe fruits individually and cut them transversely into $\frac{1}{2}$-$\frac{3}{4}''$ thick slices using stainless steel knives to avoid black-staining of the slices.

3. **Preparation of syrup**—Prepare 25–30 per cent sugar syrup with 0.2 per cent acidity (as citric acid) by dissolving one cup sugar with 3 cups of water and 1/8 oz. of citric acid. Heat the mix and bring it to boil. Filter the syrup, if necessary.

4. **Filling and syruping**—Fill the 1 lb. tin can with 12–13 oz. of the prepared slices and arrange them nicely in the can. Pour boiling hot sugar syrup over the slices filling the can so as to leave 1/8–$\frac{1}{4}''$ head space.

5. **Exhausting**—Place the filled cans with the lids on their tops in a vessel containing boiling water in such a way that the tops of the cans are about 1–1$\frac{1}{2}''$ above the surface of water. This process is done for 6–7 minutes to remove the dissolved air.

6. **Sealing**—Remove the cans from the exhaust vessel and seal them immediately by means of a can-sealer. Different types of can sealers viz.,

Burpee, Dixie and other types, are available in India which are suitable for the purpose.

7. **Processing**–Put the sealed cans in a pressure cooker and steam sterilize them at 5 lb. pressure (sea level) for 20–25 minutes. Release the pressure of the steam gradually till it comes down to zero. Open the lid of the pressure cooker and remove the sterilized cans.

Note—For places above the level, the cooking time should be increased by 2 minutes for every 1000 ft. rise in the altitude.

8. **Cooling and Storage**—Place the cans under running water so that they cool to a little above the room temperature. This quick cooling helps to prevent over-cooking of the fruit and the final temperature of the cans avoids rusting during storage.

9. **Uses**—The canned fruit is served either as such or with other fruits, fresh or canned, and/or cream, to make a delightful salad.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATION SERIES

LEAFLET No. 54

Canning & Bottling of Processed Peas

1. **Selection of material**—Select dried peas of uniform size and quality rejecting such grains as have been attacked by insects in any way.

2. **Preliminary treatment**—Soak the peas in 3 times the quantity of water for 16–18 hours. Select out the grains which have not absorbed water and are hard as before and reject them. Wash the soaked peas thoroughly to remove extraneous matter.

3. **Blanching**—Wrap the soaked grains in a piece of muslin cloth and then dip in boiling water for 5 minutes so that the test grains are soft enough to be pressed by hand. Remove the muslin bag from the boiling water and dip in cold water immediatly thereafter.

Note: The boiling water for blanching should be used as many times as there is no frothing and then replace it by fresh water.

4. **Filling and storage**—Examine the blanched peas and remove the insect damaged grains, if any. Fill the sterilized cans or glass jars with the sorted blanched peas arranged in an attractive manner so as to contain the minimum weight of the peas viz., 16 ozs. for A $2\frac{1}{2}$ size can; $8\frac{1}{2}$ ozs. for pint glass jars and $7\frac{1}{2}$ ozs. for butter size cans. Fill the interspace with hot brine containing 2 per cent common salt, 4 per cent sugar and a little mint flavour and requisite quantity of edible green colour (Edicol supra pea green of I. C. I.) leaving about $\frac{1}{4}$–3/8″ of space at the top.

Note: The brine before use should be filtered through a thick cloth to remove all traces of dust etc.

5. **Exhausting**—Place the filled cans or glass jars in boiling water bath having a false bottom (an open pan with 2–4 layers of thick cloth or a small wooden framework placed at its bottom) and keep them till the centre of the can or the glass jar records a temperature of 180°F., for about 8-10 minutes.

6. **Sealing**—Immediately after the exhaust process is complete seal the cans with a can sealer after making sure that the filling liquid, if spilt out, has been duly replaced by fresh boiling brine. In the case of glass jars, the lids must necessarily have a rubber ring in between the mouth of the jar and its top. This ensures the contents of the cans/glass jars to have been perfectly sealed off from the outside contamination.

7. **Processing**—The sealed cans are processed *i. e.*, heated at 240°F. (10 lb. steam pressure) in a pressure cooker for 40 minutes in the case of A2½ size cans and glass jars and 30 minutes for butter size cans.

8. **Cooling and storage**—Cool the cans by placing them under running cold water till these are a little above the room temperature when these may be wiped dry and properly labelled. Remove the glass jars from the pressure cooker and allow them to cool in the air. Store the finished product in a cool dry place.

9. **Uses**—The product is used as a ready-to serve article for lunches and dinners and is more useful for picnics and other similar campaigns.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE FRUIT AND VEGETABLE PREPARATIONS SERIES

LEAFLET No. 55

Preparation & preservation of Almond Syrup

1. **Introduction**—Almond syrup is a popular beverage in North India and other hot and dry places. It is considered a tonic which quenches the thirst and refreshes the body. In places like Delhi and the Punjab, this is very much in demand.

2. **Selection of the raw material**—Almonds of good quality, which do not give kernels of bitter taste, are selected and the shell removed by breaking with a hammer.

3. **Preliminary treatment**—Soak the almond kernels in almost boiling water for some time and remove the loosened peel.

4. **Recipe**—*Sugar, 40 lb; almond kernels, $1\frac{1}{2}$ lb; citric or tartaric acid, $\frac{1}{4}$ oz; essence (*Kewra* or rose), cardamom, saffron, as desired.

* To yield 25 quart bottles.

5. **Preparation of milk of almond**–Grind the peeled almond kernels very finely in a mortar and pestle using small quantities of water during the grinding which is thereby facilitated. Strain the thick paste of almond kernels through a coarse muslin cloth and get milk of almond. Repeat the processes of grinding and straining 2-3 times.

6. **Preparation of sugar syrup**—Mix the sugar with 1/3 its quantity of water and boil until the temperature of the boiling syrup reaches 221°F. Sprinkle small quantity of cow's milk over the syrup and continue boiling for another 5 minutes and then add citric or tartaric acid in the proportion

indicated above. Remove the impurities which form a scum at the top and discontinue syrup from boiling.

7. **Mixing of the ingredients**—Mix the milk of almond with the sugar syrup prepared in the manner described above and boil the mixutre till the temperature reaches 223–224°F. Allow the syrup to cool.

8. **Colouring and flavouring**—Add the desired additives viz., essence (*Kewra* or rose or both), saffron, cardamom when the syrup is sufficiently cooled down and fill the finished product in thoroughly cleaned and sterilized bottles.

9. **Preservation**—Place the filled bottles in hot water (200°F) for 25–30 minutes or add sodium benzoate (dissolved in a small quantity of water) at the rate of $1\frac{1}{2}$ oz. per 100 pounds of the finished product and pack in bottles which should then be made air-tight.

10. **Storage and Uses**—Keep the filled bottles in a cool dry place. Dilute the squash 5-6 times with ice cold water for use as a refreshing drink.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE SUBSTITUTE FOODS SERIES

LEAFLET No. 1

Preparation of Soyabean Milk

It is well known that the total production of milk and milk products in India falls short of the minimum nutritional requirements of the population. Our country is obliged to import annually, condensed milk, powder milk and other milk products valued at more than two lakhs rupees and the imports are increasing every year. The processing of vegetable materials into edible milk offers itself, therefore, as a practical proposition to supplement our meagre supply of animal milk. Vegetable milks can be cheap and effective supplements to poor cereal diets.

The processing of soyabean for the production of milk, curd and sauce has been known and practised in China for several centuries. An exhaustive investigation of the method of preparation, the properties and nutritive value of the soyabean milk was carried out at the Indian Institute of Science, Bangalore, since 1944. As a result, the method, given below, was standardized, which is an improvement over the traditional Chinese method.

Preparation of soyabean milk

Removal of husk—First, the husk from the beans is removed. For this purpose, the beans are allowed to soak in water until soft and the skin or the husk is removed by rubbing and washing with water. In this method, the beans, prior to removing the husk, are allowed to germinate for 24–48 hours in shallow trays. An alternative method which lends itself especially to large-scale manufacture is to soak the beans in water for 2-4 hours, dry them and remove the skin by rubbing between wooden or stone rollers. The dhal thus obtained is then softened by soaking in water for 4-6 hours before extraction.

Extraction–At this stage, the beans contain a bitter principle and have a slightly yellow colour. To remove these, extract the beans with water containing 0.04—0.06 % sodium bicarbonate at about 60°C for 10-15 minutes. Extraction in hot always gives a milk of better flavour and taste than extraction in cold.

Pasting—The extracted beans are well washed with water and made into a fine paste using a stone grinder as is used ordinarily in homes. For large-scale manufacture, the grinding operation is usually carried out in two stages. First, a coarse paste is made by grinding in an edge-runner and then a fine paste is prepared by using a granite roller mill.

Addition of water and filtration–The paste is stirred with water (six times the weight of the original beans taken). If facilities are available, the reaction of the mixture may be adjusted to pH 6.6 so that the milk may keep well, without curdling, for a longer period. The mixture is boiled for 15 minutes, allowed to cool slightly and then strained through a fine cloth. Sugar (2%) and a small quantity of common salt are added to the milk to improve its taste. The residue can be used for other preparations.

Steaming and fortification–The milk so prepared has a nutty smell. Most of the smell can be removed by bringing the milk to a boil and then bubbling steam through it for 15-20 minutes. After cooling, the milk can be fortified with calcium, by the addition of calcium hydrogen phosphate and vitamins A and D.

Cost—The cost of soyabean milk is estimated at about 2½ as. per lb.

Nutritive value–Soyabean milk is more digestible than the raw beans The proteins of the soya milk are 90% as good as those of cows' milk. Soya milk is a rich source of B-complex vitamins.

Other products—Good quality curd* and curd products can be made from soya milk by souring with buttermilk in the usual way. The residue obtained in the preparation of the milk can be used to make *Dosais*, *Bajiyas Pakoda*, *Vadais* etc. It can also be ground and used with wheat flour to the extent of 30-40 % for making bread; biscuts, etc.

*For preparing good sour curd, add about 1% of invert sugar to milk.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE SUBSTITUTE FOODS SERIES

LEAFLET No. 2

Preparation of Synthetic Grains

Raw materials—The two important raw materials required for the preparation of synthetic grains are (i) tapioca and (ii) groundnut cake flour of good quality. Tapioca tubers are washed free from adhering dirt and the outer skin and the inner rind are peeled off. The peeled tubers are washed and cut into slices which are dried in the sun. The dried chips are finally powdered into fine flour and passed through a seventy mesh sieve. The groundnut cake flour is prepared from groundnuts which are carefully sorted and freed from cuticle and grit. The oil is pressed out in an expeller and the cake ground to fine flour in a mill.

Equipment required :

(i) Shakingtray: A wooden frame 4′ × 2′ with a thick cloth bottom, preferably of canvas or metallic bottom (aluminum or galvanized iron)

(ii) Sieves of size 18″ × 18″ with 6, 8 and 10 meshes to an inch.

Processing :

(i) **Mixing and kneading**—Fifteen parts by weight of groundnut cake flour are stirred with 70-80 parts of water into a well-dispersed suspension which is poured on to 85 parts of tapioca flour. On mixing thoroughly a dough is obtained.

(ii) **Granulation:** The dough is taken in small lots and rubbed over a sieve (6 mesh to an inch) so that it breaks up into tiny coarse granules. The granules are shaken vigorously in a tray (4′x2′) so that they are thrown from one end of the tray to the other. In 15-20 minutes, strong round grains will be formed. The shaking is best done by two persons holding the tray, one at each end.

(iii) **Grading**—The grains are passed first through a sieve of 8 mesh and then through another of 10 mesh. The grains passing through 8 mesh and retained on 10 mesh sieve are suitable for further processing. The larger and smaller grains are made into a dough and used again.

Gelatinization—The grains are transferred in small quatities into a hot pan and stirred until completely gelatinized. Heating for 12-15 minutes removes part of the moisture and imparts strength to the grains. The grains then develop a pale yellowish colour and are rubbery in feel when pressed between fingers.

(iv) **Drying**—The grains are then spread in shallow trays and kept in the sun. Drying is usually complete in 5-6 hours in the bright sun.

(v) **Roasting**—After this, the grains are roasted with constant raking, in a hot pan for 4-5 minutes.

Cooking—The required quantity of the grains is added to 5-6 times its volume of boiling water and stirred occasionally. Cooking will be complete in about 10 minutes. The gruel is drained out. The cooked grain is ready for serving as such or for preparing sweet and savoury dishes.

Cost—The grains will cost about $3\frac{1}{2}$ annas a lb.

Nutritive value—In their calcium content, synthetic grains are superior to rice. Judged by rat-growth experiments, the over-all nutritive value of synthetic grains is also superior to that of rice.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE SUBSTITUTE FOOD SERIES

LEAFLET No 3

Preparation of Groundnut Milk

In India the quantity of whole milk required per capita for a balanced diet is estimated at 10 ounces per day, whereas the quantity of milk and milk products actually available for consumption per capita is about 5 ozs. Under these circumstances, economical conversion of vegetable materials into easily digestible and nutritive milk-like emulsions is a practical proposition.

The method, given below, for the preparation of groundnut milk has been standardized at the Central Food Technological Research Institute, Mysore.

Preparation of Groundnut Milk

1. **Removal of husk**—This can be done by hand or decorticator.
2. **Selection**—Select good mature kernels (seeds).

3. **Removal of cuticle (red skin)**—Soak in hot water for 5 - 10 minutes or gently heat the kernels in a pan for about 5 minutes and cool. Rub mechanically to remove the cuticle.

4. **Pasting**—Prepare a fine paste using a stone grinder and stir it up with water (4 times the weight of the kernels).

5 **Filtering**—Strain the contents through a mull cloth to get a milk-like emulsion. Keep the residue for ohter uses.

6. **Addition of lime water**—Add about 1 lb. of saturated lime water,

slowly and with constant stirring, to every 4 lb. of the emulsion. The correct quantity of lime water will give a very faint yellow colour to the milk.

7. **Steaming**–Heat the emulsion to boiling and pass steam through it for about 45 minutes when the characteristic nutty flavour will be completely removed.

8. **Cooling**—Cool the milk by immersing the vessel in a tank of cold water.

9. **Stabilization**–Dissolve 1 gm. of sodium citrate in a small quantity of water and add the solution slowly, and with stirring, to 1 lb. of milk.

10. **Addition of water and suagr**–To the final product, add extra water to make 6 lb. of milk for every pound of groundnut kernels taken. Add sugar according to taste (usually 3%).

Cost – Groundnut milk will cost about 2½ as. per lb.

Nutritive value–The proteins of groundnut milk are 80% as good as those of cow's milk and the milk is a good source of some vitamins of B group.

Other Preparations–Curd* and other preparations can be made from the milk in the usual way. The residue can be mixed with black gram flour for the preparation of "Dahi Wadas", "Pakodas", "Dosais" etc. Alternatively, it can be dried and mixed with wheat flour for making chapatis, biscuits etc.

* For the preparation of sour curd of good texture and aroma, add either 1% of invert sugar or 10—15 of cow's milk to the unsweetened groundnut milk.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE SUBSTITUTE FOOD SERIES

LEAFLET No. 4

Preparation of Bomboo Candy

1. **Introduction**—Bamboo shoots are used as an article of food by poorer classes of people during famines. Bamboos are found in the forests of Assam, Bengal, Bihar, Madhya Pradesh, Travancore, Madras, Orissa and Mysore.

For the preparation of edible products, stunted or mis-shaped shoots, which are not likely to produce good quality bamboos, may be used.

2. **Selection of raw material**-Select tender bamboo shoots 1½-2 ft. long.

3. **Preparation**—Remove the sheaths or outer covering leaves with a sharp knife. Cut the tender portions into rings or pieces of suitable size. Scrape off thinly, green portions, if any, on the pieces. (Leafy portions towards the growing tip may be used for making chutney).

4. **Removal of bitterness**–Tender bamboo shoots are bitter in taste. To remove the bitterness, boil the rings or pieces of shoots 2-3 times for half an hour each time. Change the water every time. Prick the boiled pieces with stainless steel needles or forks.

5. **Preparation of syrup**–Prepare 30° Brix syrup by mixing 3 parts of sugar with 7 parts of water and strain. (Use about 1¾ lb. of syrup for a lb. of shoots).

6. **Candying** –Boil the pricked rings or pieces of shoots for a few minutes in the syrup as prepared above. The syrup should completely

cover the shoots. Allow the shoots to stand in the syrup for 24 hours. Then determine the percentage of sugar in the syrup by means of a Brix hydrometer. (It will be found to be less than 30° Brix due to the absorption of sugar by bamboo shoots).

7. **Increase of sugar concentration**—Drain the syrup and increase its concentration by about 10 per cent by adding more sugar. Bring the syrup to a boil and pour it back on the shoots. Repeat this every day until the concentration of the syrup reaches about 60° Brix. At this stage, add a small quantity of citric or tartaric acid (about 0.1 per cent of the total weight of syrup). Then, increase the strength of the syrup by 5° Brix each day till it reaches 75° Brix. Keep the product in the syrup for a week or so.

8. **Packing and Storage**–Boil the shoot along with the syrup for about 5 minutes. While still hot, drain the syrup and roll the pieces in finely ground sugar. Place the pieces on wooden trays and dry them in shade. Pack in dry containers and seal air-tight. Store in a cool dry place. If desired, individual pieces may be wrapped in cellophane paper.

Note: If any flavour is to be added, it may be added at the time of rolling the pieces into sugar.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE SUBSTITUTE FOOD SERIES

LEAFLET No. 5

Preparation of Bamboo Chutney (Sweet)

1. **Introduction**–There are vast stretches of bamboo forests in Assam, Bengal, Bihar, Hydrabad, Madhya Pradesh, Madras, Mysore, Orissa and Travancore. In many of the bamboo clumps, curved or mis–shaped shoots are formed which are wasted. Tender parts of such shoots can be converted into several palatable food products, such as bamboo candy, bamboo chutney, bamboo pickle and bamboo shoots in syrup and brine The method of preparation of Bamboo Chutney (Sweet) is given helow:

2. **Selection of raw material**-Select healthy bamboo shoots 1½-2′ long.

3. **Preliminary treatment**—Remove the outer covering leaves or sheaths with the help of a sharp knife and cut the tender portion into large pieces. Scrape off thinly the green portion if any, on the pieces. The tender leafy portion towards the growing point should be cut into large pieces and mixed with the bamboo pieces.

4. **Removal of bitterness**–To remove the bitterness in these shoots, boil the shoots prepared as above, 2-3 times for half an hour changing water every time.

5. **Preparation**–Mince the boiled shoots and leaves with a meat mincer or chop them finely with a sharp knife.

6. **Recipe**–The following recipe may be followed.

Minced or chopped tender shoots	...4 lb.
Sugar	.. 4 lb,
Salt	...3 ozs.

Cardamom, cinnamon and cumin in equal quantities	...2 ozs.
Red chillies finely ground	...1 oz.
Onion finely chopped	...1 oz.
Garlic finely chopped	...1 oz.
Vinegar (good quality)	...3 ozs.

7. **Cooking**–Add sugar, salt and a little water to the minced bamboo shoots end warm in an aluminum pan till sugar and salt have gone into soution. Mix all thespicesand tieloose ly in a thick muslin bag which should be left in the pan Continue cooking till the material is softened and has acquired the consisistency of a jam. At this stage, remove the bag from the pan and press the contents. Add vinegar, and and boil again to the desired consistency.

8. **Packing and storage**—Cool the product a little and pack into clean dry wide-mouthed jars which should be sealed air-tight. Store in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE SUBSTITUTE FOOD SERIES

LEAFLET No 6

Canning of Bamboo Shoots in Syrup

1. **Introduction**--There are vast stretches of bamboo forests in Assam, Bengal, Bihar, Hyderabad, Madhya Pradesh, Mysore, Orissa and Travancore. In many of the bamboo clumps, curved or mis-shaped shoots are formed which are wasted. Tender parts of such shoots can be converted into several palatable food products such as bamboo candy, bamboo chutney, bamboo pickle, and bamboo shoots in syrup and brine. The method of canning of bamhoo shoots in syrup is given below :

2. **Selection of raw material**-Select healthy bamboo shoots $1\frac{1}{2}$-2′ long.

3. **Preliminary treatment**-Remove the outer covering leaves or sheaths with a sharp knife and cut the tender portions into pieces of suitable size. Scrape off thinly the green portions, if any, on the pieces. (The tender leafy portions towards the growing point may be used for making chutney)

4. **Removal of bitterness**—To remove bitterness, boil the shoots prepared as above in water 2-3 times for half an hour, changing the water every time.

5. **Preparation**—Prick the boiled pieces with stainless steel needles or forks.

6. **Filling into cans**– Fill the prepared pieces n plain cans, leaving $\frac{3}{8}$ inch head space.

7. **Syruping**—Prepare 40° Brix syrup containing 0.1 per cent citric acid by mixing 4 lb. of sugar, 4.5 grams citric acid and 6 lb. of water and filtering the mixture. Bring the syrup to boil and pour into cans filling ¼ inch from the top.

8. **Exhausting and sealing**—Place the cans in boiling water so that the top of the can is 1-1½ inch above the level of water, Heat the cans for 5-6 minutes or until the temperature in the centre of the can is about 200°F. Remove the cans from the bath and seal immediately with a can Sealer.

9. **Processing**—Process the sealed cans in a pressure cooker at 10 lb. pressure (240°F) for the following timings:

1 lb. Jam size cans	... 40 muniuts
1 lb. Butter size cans	... 50 ,,
No. 2½ cans	... 50 ,,

10. **Cooling and storage**—After processing, cool the cans in running cold water, wipe them dry, and store them in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE SUBSTITUTE FOOD SERIES

LEAFLET No. 7

Canning of Bamboo Shoots in Brine

1. **Introduction**—There are vast stretches of bamboo forests in Assam, Bengal, Bihar, Hyderabad, Madhya Pradesh, Madras, Mysore, Orissa and Travancore. In many of the bamboo clumps, curved or mis-shaped shoots are formed which are wasted. Tender parts of such shoots can be preserved in brine for conversion into bamboo pickles or curried vegetables. The method of preparation of bamboo shoots in brine is given below.

2. **Selection of material**—Select healthy bamboo shoots 1½-2 ft. long.

3. **Preparation**-With a sharp knife make incisions in the outer covering leaves or sheaths at the nodes and peel off the sheaths. Cut the tender portions into pieces of suitable size. Scrape off thinly, the green portions, if any, on the pieces. The tender leafy portion towards the growing point may be used for making chutney.

4. **Removal of bitterness**–Tender bamboo shoots are bitter in taste. To remove the bitterness, boil the prepared shoots 2-3 times for half an hour, changing water every time.

5. **Filling into cans**—Fill plain cans with boiled pieces, keeping about ⅜ inches head space.

6. **Brining**—Prepare 2.0 per cent common salt solution by using 3¼ ounces of refined table salt per gallon of water. Bring the solution to boil, strain it through cloth, and pour hot into the cans, keeping ¼″ head space.

7. **Exhausting and sealing**—Place the cans in boiling water so that the top of the can is about 1-1½ inches above the level of water. Heat the cans for 5-6 minutes or until the temperature in the centre of the can is about 200°F. Remove the cans from the bath and seal immediately with a can sealer.

8. **Processing**—Process the sealed cans in a pressure cooker at 10 lb. pressure (240°F) for the following timings.

1 lb. Jam size cans	... 40 minutes
1 lb. Butter size cans	... 50 ,,
No. 2½ cans	... 50 ,,

9. **Cooling and storage**—After processing, cool the cans in running cold water, wipe them dry, label and place them in cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME–SCALE SUBSTITUTE FOOD SERIES

LEAFLET No. 8

Canning of Bamboo Shoots in Curried Vegetables

1. **Introduction**—There are vast stretches of bamboo forests in Assam, Bengal, Bihar, Hyderabad, Madhya Pradesh, Madras, Mysore, Orissa and Travancore. Bamboos grow in clumps and in many clumps, curved or mis-shaped shoots are formed which are wasted. Tender parts of such shoots can be converted into palatable food products such as bamboo candy, chutney, bamboo in syrup and brine, curried vegetable and pickle. The method of canning bamboo shoots in curried vegetable is given below :

2. **Selection of vegetables**—Select healthy bamboo shoots (1½-2 feet long), ripe tomatoes, compact heads of cauliflower and fresh green peas of good quality.

3. **Preparation of canning material**—

(a) *Bamboo shoots*—Remove the outer covering leaves or sheaths with a sharp knife. Cut the tender portions into pieces of desired size. Scrape off thinly green portions, if any, on the pieces. The tender leafy portions tawards the growing point may minced and used, or reserved for making chutney.

Removal of bitterness—To remove bitterness, boil the cut shoots 2-3 times for half an hour, changing the water every time. This is an important step which must be attended to.

(b) *Other vegetables*—Prepare the other vegetables as usual.

(c) *The liquid medium*—For preparing the liquid medium for the vegetables use ingredients in the proportions given below ;

Mustard (whole)	...3 ozs.
Coriander (powder)	...3 ozs.
Red chillies (powder)	2-3 ozs.

Caraway seeds	...3 ozs.
Water	...As necessary.
Turmeric (powder)	...6-7 ozs.
Common salt (powder)	...13 ozs.
Vegetable fat (hydrogenated oil)	...56 ozs.

Heat the required quantity of fat, in a pan, till a few grains of mustard when added to it produce a crackling sound. Then, add the entire quantity of mustard grains and fry for a few minutes. Add the other spices and fry. Add the requisite quantity of water and salt, stir thoroughly and bring to boil.

4. **Filling into cans**—Fill plain A 2½ cans with the prepared meterial, in any of the combinations mentioned below, leaving ⅛″ head-space. Add the hot liquid medium to within quarter inch from the top of the can.

The vegetables and the liquid medium may be canned in the following proportions.

Combination of vegetables	wt. of vegetables (ozs.)	wt. of liquid medium (oz.)
1. Bamboo-cauliflower	17.0-17.5	10.5-11.0
2. Bamboo-Tomato	24.0	4.0
3. Bamboo Peas	15.0	13.0

5. **Exhausting and sealing**–Place the filled cans immediately in a boiling water bath for 5-6 minutes, or until the temperature in the centre of the can reaches 180-190°F. Remove the cans from the bath and seal them immediately with a Can Sealer.

6. **Processing** - Process the sealed cans in a pressure cooker at 10 lb. pressure (240°F) for 70-75 minutes, depending on the kind and maturity of the vegetables and the quantity of fat in the final product.

7. **Cooling and storage**—After processing, cool the cans in running cold water, wipe them dry and store them in a cool dry place.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE PREPARATION & PRESERVATION OF INDIAN SWEETS SERIES

LEAFLET No 1

Preparation & Preservation of Shrikhand Wadi

1. **Introduction**–Shrikhand Wadi is a popular sweetmeat particularly in Maharashtra. It is a concentrated food product with more than 90 per cent total solids. Because of the ingredients used in its preparation viz., sugar and milk, the product is also very nutritious.

2. **Selection of the material**–Properly set sweet milk curd (which may be just sour but not very sour) and sugar (white and fine quality) should be used for the purpose.

3. **Preparation of the material**–Drain the sweet milk curd through a filter cloth removing as much of the water as possible. Grind the sugar to make a fine powder.

4. **Method of preparation of the product**—Transfer the drained curd to a frying pan and heat on a fire with continuous stirring by a ladle. Continue drying the curd till the material is as thick a *khowa* (moisture 20-25 per cent). Add finely powdered sugar equal in weight to that of the drained curd. Mix the two components thoroughly, but if the material is very dry add a small quantity of water so that the consistency of the mix is similar to that of the wheat dough used for *chapathi* making.

5. **Addition of colouring and flavouring material**—Use saffron at the rate of about $1\text{-}1\frac{1}{2}$ grains per pound of the finished product which gives an attractive yellow coloured product.

Note: Dissolve saffron in a spoonful of water and mix with the product so prepared.

6. **Preparation of the finished product**—Heat the final mass with continuous stirring till the material is quite warm. Spread the warn finished product on a plate. Allow it to cool and set. Cut into rectangular pieces which are known as 'Wadis'.

7. Composition of the finished product—Shrikhand Wadi made by the method described above has a crisp texture and its typical composition is moisture 6.5 per cent, sugar 77.8 per cent, fat 7.5 per cent, protein 7.7 per cent, acid 1.0 percent and ash 0.8 per cent.

8. Packaging and storage—Wrap the individual pieces of the finished product in wax or glassine paper and pack the wrapped product in friction-type air-tight tin containers.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE PREPARATION & PRESERVATION OF INDIAN SWEETS SERIES

LEAFLET No 2

Preparation & Preservation of Besan Wadi

1. **Introduction**--Besan Wadi is an Indian sweetmeet common in all cities big and small; it is prepared from Bengal gram flour, edible fat and crystallized sugar. The preparation meets various requirements of protein, carbohydrates, and fats and is a nutrious product.

2. **Selection and preparation of the material**— Grind the thoroughly cleaned and dehusked Bengal gram dhal into a flour fine enough to pass through a sixty mesh sieve. Grind the sugar into a fine powder.

3. **Method of preparation**–Take about 6 oz. of butter, ghee or vanaspati in the frying pan and heat on a fire till it completely melts. Add butylated hydroxianisole (BHA) to the hot melted fat in the proportion of 100 p.p.m. on the weight of the fat. Add 10 oz of the finely powdered Bengal gram flour and mix it well, continue stirring till the roasted material turns golden brown. Add 7 oz of finely powdered sugar, mix it well; continue heating till the material gets slightly soft.

4. **Preparation of the finished product**–Spread the material from the frying pan on a plate and roll it to half an inch thickness. Allow the rolled mass to cool and set. Cut into rectangular pieces ($1\frac{1}{2}''$x$1''$x$\frac{1}{2}''$) which are known as Besan Wadis.

5. **Packing and storage**—Wrap the individual pieces of the finished product in wax or glassine paper and store the wrapped product in airtight tin or glass container. Under these conditions, the product keeps well for a period of 6-8 months.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE

HOME-SCALE PREPARATION & PRESERVATION OF INDIAN SWEET SERIES

LEAFLET No. 3

Preparation & Preservation of Rossogolla

1. **Introduction**—*Rossogolla* is an Indian sweet common in Bengal, Bihar and some places in North India. Made from cow's milk and crystallized sugar, it is a nutritious and delicious preparation.

2. **Slection of the material**–Use good, wholesome cow's milk and clean white crystal sugar. Use whey or 1 per cent citric acid solution (1 part for every 6-7 parts of milk) or lime juice (two fruits for 3-4 lbs. of milk) for the curdling of milk.

3. **Preparation of channa**—Heat the milk in a frying pan on a medium fire and bring it to boil. Stir continually so that the scum does not form. Remove the pan from the fire and slowly add whey, citric acid solution or lime juice, stirring the milk all the time. Stop addition of the whey, citric acid solution or the lime juice as soon as the milk starts curlding. Stir well and add a little of whey, citric acid solution or lime juice, if necessary, so that the watery liquid separates from the solids. Drain as quickly as possible the watery portion or whey on a piece of mull cloth by suitably manipulating the filtering cloth. Then tie the four ends of the filtering cloth thus forming a bag. Immerse the bag containing the milk solids in cold water for about 10-15 minutes by which time the contents will be cooled. Remove the cloth bag and drain all the whey by gentle squeezing and pressing the bag. The residual material inside the cloth bag is called channa.

N.B.—Channa should not be very wet and should have the consistency of soft wheat dough.

4. **Mixing and kneading**–Mix the channa well and knead it thoroughly so that it becomes soft and smooth. Prepare small round balls of about $\frac{1}{2}$-$\frac{3}{4}$" diameter from this channa ("raw rossogollas").

5. **Preparation of sugar syrup**—Dissolve one and a half cups of sugar in one cup of water to prepare a syrup of 60° Brix to be used for the first step of cooking. Similarly prepare syrup of 50° Brix (to be used for the final suspension of the prepared rossogolla) by dissolving one cup sugar in one cup of water. Heat the syrups to boiling and clarify by the addition of a small quantity of milk before use.

6. **Cooking of raw rossogollas**—Bring 60° Brix syrup to boil and immerse the raw rossogollas. Boil for 15-20 minutes turning the rossogollas slowly with a perforated ladle, till the syrup is sufficiently thick.

7. **Preparation of the final product**—Remove the cooked rossogollas, drain and immerse in the 50° Brix syrup. Flavour the final syrup with rose or any other essence. Rossogollas thus prepared keep well for 3-4 days but for longer storage, canning should be done.

8 **Preservation by canning**—Fill the prepared rossogollas in sterillized can (16-18 rossogollas in a 1 lb. butter can) and fill the interspece with boiling 50° Brix syrup prepared as above. Immediately seal the cans with a can sealer*. Process the closed cans in a pressure cooker at 15 lbs. pressure for 15 minutes. Cool the cans in cold water. Under such conditions, the product, though it turns slightly brown, has been found to keep for more than 6 months.

* This equipment may be obtained from The Metal Box Co. of India, Chowringhee, Calcutta–20.

Further information can be had from the Director, Central Food Technological Research Institute, Mysore.

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